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FOOD TECHNOLOGY ABSTRACTS

Vol. 29 No. 1
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ADP	adenosine diphosphate
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GENERAL

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Bryan (FL). **HACCP - Street vending in developing countries.** *Food Australia* 45(1); 1993; 80-84

Review article covers, the conditions of street vending, street vending and foodborne disease, microbial contamination of street-vended foods, hazard analysis for street-vended foods critical control points in street-vending, verification of safety of street-vended foods and towards safe street-vended foods. 20 references. SRA

2

Wrick (KL), Friedman (LJ), Brewda (JK) and Carroll (JJ). **Consumer viewpoints on "designer foods".** *Food Technology* 47(3); 1993; 94, 96, 98, 100, 104

The survey broadly explores the attitudes about diet-health relationships and some of the responses were used in the design and implementation of two employee focus groups. The focus group discussions were inturn used as a guide in developing a series of questions for the third phase of work, a national telephone survey. CSA

FOOD PROCESSING

3

Sgaramella (S) and Ames (JM). **The development and control of colour in extrusion cooked foods.** *Food Chemistry* 46(2); 1993; 129-132

Wheat starch, glucose and lysine mixtures at 96:3:1 and 92:6:2 (m.m.m.) with 13, 15 and 18% moisture contents were extrusion cooked at 125 and 135°C target die temp. CIELAB $L^*a^*b^*$ measurements for ground extrudate samples showed that increasing die temp. or the amounts of glucose and lysine or decreasing moisture content increased the colour intensity and decreased L^* and increased a^* and b^* values. Decreasing moisture content from 18 to 13% had greater influence on colour development than increasing die temp. Moisture contents of 13 and 15% resulted in better expanded products than 18% moisture. SD

4

Kres-Rogers (E). **New and emerging instrumentation for quality assurance.** *Trends in Food Science and Technology* 4(2); 1993; 35-41

This article examines instrumentation needs, particularly for the on-line measurement of both physical properties and chemical composition. Instrumentation and sensor technologies to meet these needs are highlighted. The role of developments in mathematical methods and software for instrument optimization and interpretation of the readings is also highlighted. 41 references. BV

5

Seng (SC) and Babji (AS). **The effect of cook-chill system on the microbiological status of some Malaysian meals.** *ASEAN Food Journal* 8(3); 1993; 94-98

FOOD PACKAGING

Packaging materials

6

Indiramma (AR), Baldev Raj, Kamalamma (V), Balasubrahmanyam (N) and Veerraju (P). **Migratory aspects of food packaging materials with food simulating solvents N-heptane and N-hexane.** *Deutsche Lebensmittel-Rundschau* 88(9); 1992; 279-282

To evaluate the safety of use of plastic packaging materials for food contact application, health organisations world over have laid down specification for limits of extractives in typical food simulants at different time and temp. conditions depending on the end use of the plastic packaging materials. The effect of factors like temp., time, fat simulating solvent n-hexane and n-heptane and thickness of the film on the amount of extractives has been studied. The amount of migrants/unit area are observed:to increase (1) with time obeying Fick's law of diffusion, (2) linearly with thickness up to 700 guage studied and (3) exponentially with temp. AA

FOOD ENGINEERING AND EQUIPMENT

7

Fakhouri (MO) and Ramaswamy (HS). **Temperature uniformity of microwave heated foods as influenced by product type and composition.** *Food Research International* 26(2); 1993; 89-95

Temp. uniformity following microwave heating was studied with commercially refrigerated and frozen foods, as well as with several food models formulated by incorporating different combinations of protein and fat into a starch gel. Commercialy produced foods microwave-heated according to manufacturer's instructions generally showed large temperature nonuniformity with centre temp. below 70°C (except with frozen lasagna). Temp. uniformity could be improved by heating at lower power levels for longer periods. Product composition influenced the rate and the temp. uniformity in the food model, with added fat improving both. AA

8

Jain (SK), Charan (R), Thayya (A) and Goyal (A). **Specific heat of whole milk, mosami juice and pineapple juice.** *Beverage and Food World* 20(2); 1993; 26-27

This paper presents the methodology for detn. of specific heat of liquid foods by Newton's Law cooling apparatus. The specific heat at various concn. of whole milk, mosami juice and pineapple juice are mentioned in the paper. It was observed that the specific heat decreased with increase in concn. of liquid foods. This decrease in specific heat with increase in total solid content was linear for all three liquid foods. SRA

9

Rose (SA). **The importance of temperature control in distribution of chilled and frozen foods.** *Beverage and Food World* 20(4); 1993; 16-17

Briefly discusses the factors influencing the microflora of frozen and chilled foods, storage changes, recommended temp. and legislation. BV

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

10

Srikumar (TS). **The mineral and trace element composition of vegetables, pulses and cereals of Southern India.** *Food Chemistry* 46(2); 1993; 163-167

Zn, Fe, Mn and K were higher in wheat than in rice and pulses; Zn, Cu, Mg, Se, Ca and Fe higher in wheat, rice and pulses than vegetables and Pb, Cd and Hg were higher in wheat, rice and amaranth leaves than pulses. Zn, Cu, Mg, Ca and Se were higher in lady's finger than raw plantain, brinjal and amaranth leaves. The estimates of daily intake of Zn, Ca were inadequate; Cu, Mg, Se, Mn and Fe sufficient; Pb, Hg below and above the tolerable daily intake. SD

11

Jarms (U), Maier (HG) and Hillmar (S). **Acids of the chicory root. IV. The balance of malic and citric acid during roasting.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 245-248 (De)

Malic and citric acids were determined by enzymatic analysis in a series of roasted chicory roots. The content of these acids decreased to about 30% with increasing degree of roast: 37% of the malic acid and 44% of the citric acid formed compounds with soluble and insoluble substances in the chicory root. These compounds can be hydrolysed by alkali. According to model experiments they appeared to be esters. These esters represent the main products during roasting besides the products of dehydration and decarboxylation and volatile compounds. AA

Chemistry(Analytical)

12

Finglas (PM), Faure (U) and Southgate (DAT). **First BCR-intercomparison on the determination of folates in food.** *Food Chemistry* 46(2); 1993; 199-213

In all 18 participants from 8 countries participated adopting 4 methods viz., microbiological assay (MA), HPLC, radio protein-binding assay (RPBA) and enzyme protein-binding assay (EPBA). Results indicated reasonable agreement between lab. for detn. of folates in food by MA and possibility of improvements by optimization of the extraction and deconjugation steps especially the choice and preparation of deconjugates enzyme. SD

13

White (JP), Davidson (VJ) and Otten (L). **A capillary viscometer for characterization of fluid foods.** *Food Research International* 26(2); 1993; 109-113

A multi-section capillary viscometer was designed and tested for measuring the rheological properties of food materials (e.g. power-law parameters, thixotropy). The apparatus included a data aquisition system to collect flow rate, temp. and differential pressure measurements as inputs to a BASIC algorithm which computed estimates of the power-law parameters in real time. The apparatus was tested for steady-state and dynamic measurements, and an analysis of the effects of measurement errors on the parameter estimates was completed. Rheological properties of representative food materials (carboxymethyl cellulose sol., pregelatinized starch, locust bean gum) as well as systems with enzymes hydrolysing complex polysaccharides were characterised. AA

14

Ozilgen (S) and Reid (DS). **The use of DSC to study the effects of solutes on heterogenous ice nucleation kinetics in model food emulsions.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 116-120

Effects of sucrose, D-alanine (amino acid with hydrophobic residue) and potassium nitrate on heterogenous ice nucleation kinetics were studied with a differential scanning calorimeter (DSC) in a model food emulsion by employing different solute concn. and ice nucleants: silver iodide (AgI) and *Pseudomonas syringae*. Heterogeneous nucleation rates were described with a mathematical expression in the same form as suggested by the classical homogeneous nucleation theory. Temp. effects on these rates were an exponential function of a parameter defined in terms of the reduced temp. Our results have confirmed that the type of the nucleation template was important in determining the temp. effects of the solutes on the heterogeneous nucleation rates. In the experiments with AgI, values of the model parameters were generally larger than those of the corresponding experiments with *P. syringae*. Observation with AgI/30 g/100 g sucrose solutions indicated extremely high parameter values which might be caused by the change of the catalytic site of AgI molecules and variation of the emulsion properties by highly concentrated sucrose. With the *P. syringae*/D-alanine and AgI/D-alanine systems only modest changes were observed in the model parameters with changing D-alanine concn. Experimental data with the *P. syringae*/KNO_3 system suggested that the heterogeneous ice nucleation rates might be affected by denaturation of catalytic site proteins of *P. syringae* at high salt concn. AA

15

Vilarino (C), Del Giorgio (JF), Hours (RA) and Cascone (O). **Spectrophotometric method for fungal pectinesterase activity determination.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 107-110

A continuous spectrophotometric assay modified for fungal pectinesterases is reported. This method is based on that developed by Hagerman and Austin for plant pectinesterases. The amount of carboxylic groups released during the assay is calculated from the decrease in absorbance of a pH indicator added to the reaction mixture with a pKi value within the pH range of max. enzyme activity. Bromocresol green was chosen for our modified method as fungal pectinesterases have an optimum activity at acid pHs (4.6 to 5.1) which are within the pH range of colour change (3.8 to 5.4) for this dye. Our methodology was tested by employing a commercial pectinase product as the sucrose of pectinesterases. Statistical analysis using the Student's t-test showed good agreement between the reference titrimetric method and that reported herein. AA

FOOD MICROBIOLOGY AND HYGIENE

16

Sharpe (AN). **Rapid tests for food microbiological quality.** *Food Australia* 45(3); 1993; 129-134

New methods which provide better performance in the quality control of food are described in this article. Techniques covered are direct epiflourescent filter technique (DEFT), direct INT staining, catalase test, adenosinetriphosphate detn. using bioliminescence, procedures using genetically engineered luminescent organism, electrical impedence or conductance measurement, metabolic measurement, hydrophobic grid membrane filter, *Escherichiu coli* 0157, opti-MuGcoliform/*E. coli* count, *Salmonella* spp. detection, DNA probes, polymerase chain reaction, monoclonal antibodies and identification kits and system. SRA

17

Teuber (M). **Genetic engineering techniques in food microbiology and enzymology.** *Food Reviews International* 9(3); 1993; 389-409

This review describes the clear-cut technology of fermentation-produced chymosin (1) and genetically modified baker's yeast and some other microorganisms (2) the basic concepts of risk assessment, regulation and labeling are outlined and contrasted with the facts of risk perception, amplification, and even stigmatization of genetically modified foods by the general public (3) if the discrepancy between risk perception by the experts and lay people cannot be solved. The new technique will have no chance. 60 references. SRA

18

Buescher (RW) and Burgin (C). **Diffusion plate assay for measurement of polygalacturonase activities in pickle brines.** *Journal of Food Biochemistry* 16(1); 1992; 59-68

A modified diffusion plate assay was evaluated for its efficiacy in measuring polygalaturonase (PG) activities in simulated and commercial cucumber pickle brines. The diffusion plate assay was capable of detecting low PG activities (7 x 10^{-5} PG units/mL. Clear zone diameters formed in the diffusion plate assay were highly correlated to changes in specific viscosity obtained by the conventional viscometry assay procedure. Slight, dark-stained zones appeared with an ionic strength of 1.6 (NaCl) and increased in diameter with increasing ionic strength. Ionic strengths of commercial pickle brines (0.9 - 1.8) did not interfere with the diffusion plate assay for detecting PG activity. The diffusion plate assay was observed to be a suitable and convenient alternative to the viscometry procedure for monitoring PG activities in brines used for the bulk storage of pickles. AA

Enzymes

19

Quax (WJ). **Thermostable glucose isomerases.** *Trends in Food Science and Technology* 4(2); 1993; 31-34

Reviews the use of glucose isomerase in the production of high fructose corn syrups which is an economical substitute for sucrose. The production of thermostable enzymes with improved heat stability using the protein engineering and screening techniques of thermophilic microorganisms, has also been described. 26 references. GS

20

Habulin (M) and Knez (Z). **Influence of reaction parameters on synthesis of n-butyl oleate by immobilized *Mucor miehei* lipase.** *FAT Science Technology* 95(7); 1993; 249-252

Enzymes lower the activation energy for reaction. Activation energy can be properly determined from Arrhenius plot, however the temp. range is quite limited. At temp., higher than the usual biological range, thermal deactivation occurs. In this paper some thermodynamic properties of immobilized *Mucor miehei* lipase activity, which catalyses the synthesis of n-butyl oleate are presented. Esterification was performed batch-wise in a stirred tank reactor with equimolar substrate ratio. Very low activation energy was determined (9.561 kJ.mol). At temp. higher than 80°C rapid thermal degradation occurred. The content of this process was found to be 0.898 and enthalpy was 25.877 kJ/mol. AA

Fermented foods

21

Vaidehi (MP). **'Tempe' - a biotechnological boon for nutritionally rich foods.** *Beverage and Food World* 20(4); 1993; 35-36

'Tempe' is the highly nutritive fermented food popular in Indonesia. Soybean *tempe*, soybean *tempe* with hulls, soybean + sesame *tempe*, sunflower + sesame *tempe*, peanut press cake *tempe*, rice bran + sesame *tempe*, carrot grating + greengram + sesame *tempe*, cookies, chillie biscuits, and dried chapathies are some of the enriched products with 20% *tempe* used in Indonesia. SRA

Bacteria

22

Whiting (RC) and Cygnarowiez-Provost (M). **A quantitative model for bacterial growth and decline.** *Food Microbiology* 9(4); 1992; 269-277

This model accurately describes the shape of microbial growth curves. Its 4 parameters model different portions of the curve and permit quantitative comparisons of different growth conditions. Changes in the parameters may be described by multiple regression equations. The parameter changes could also be described by other relationships such as the Arrhenius or square root functions for different temp. The assumptions in this model invite experimental verification and subsequent modifications. SRA

23

Marth (EH). **Growth and survival of *Listeria monocytogenes*, *Salmonella* species, and *Staphylococcus aureus* in the presence of sodium chloride: A review.** *Dairy, Food and Environmental Sanitation* 13(1); 1993; 14, 16-18

Review article. 41 references. SRA

24

Okiyama (A), Shirae (H), Kano (H) and Yamanaka (S). **Bacterial cellulose. I. Two-stage fermentation process for cellulose production by *Acetobacter aceti*.** *Food Hydrocolloids* 6(5); 1992; 471-477

25

Okiyama (A), Motoki (M) and Yamanaka (S). **Bacterial cellulose. II. Processing of the gelatinous cellulose for food materials.** *Food Hydrocolloids* 6(5); 1992; 479-487

26

Gatto (E), Peddie (F) and Andrews (S). **Acidification power: Performance evaluation of freeze-dried lactic acid bacteria.** *Food Australia* 45(3); 1993; 124-128

Studies of different samples of wet yeast demonstrated a positive correlation between acidification power (AP) values and fermentation performance. It is established that dried yeast cultures can also be evaluated by this method. A modified AP test is described which can be applied to freeze-dried lactic-acid bacteria. The test is simple, rapid and highly reproducible. It can be applied to fresh or freeze-dried starters that generate acid end products by the fermentation of sugars. This research has provided a strong foundation for introducing the AP test as a routine quality control procedure to the dairy industry. SRA

27

Kim (WJ). **Bacteriocins of lactic acid bacteria: their potentials as food biopreservative.** *Food Reviews International* 9(2); 1993; 299-313

This review discusses the research that has been conducted on bateriocinogenic lactic acid bacteria (LAB) - isolated from a wide var. of foods and in some instances of animal origin - and the characteristics of bacteriocins. Special emphasis is placed on their potentials for use as food preservative and on their physicochemical nature, antibacterial spectrum, and genetic behaviour. LAB covered are Pediococci, Lactobacilli (*Lactobacillus acidophilus*, *Lact. plantarum* and *Lact. sake*), Carnobacterium, Leuconostocs. Bacteriocins covered are nisin, diplococcin, lactostrepcin and lactococcin. 132 references. SRA

28

Samoon (AH). **Role of bacteria in spoilage and fermentation of beverages and foods.** *Beverage and Food World* 20(2); 1993; 15, 16, 18

Various group of bacteria (*Pseudomonadaceae*, *Enterobacteriaceae*, *Vibrionaceae*, *Micrococcaceae*, *Streptococcaceae*, *Bacilaceae*, *Lactobacillaceae*, *Propionibacteriaceae*, *Streptomycetaceae*) prevalent in food substances and surrounding environment that play a vital role in spoilage and fermentation under commercial conditions are classified. The morphological and related characteristics of important groups of bacteria associated with foods and beverage are discussed in brief. The relative importance of these bacteria in food microbiology is highlighted. SRA

Yeasts

29

Fatimah Abu Bakar, Ariff (A) and Fadzilla Abu Bakar. **Growth kinetics study of bakers' yeast (*Saccharomyces cerevisiae*).** *ASEAN Food Journal* 7(4); 1992; 205-206

The productivities of yeast cells in batch and exponential fed-batch culture systems, and the max. production of cells using sugar from tapioca flour and commercial glucose as substrates are compared in this study. Results indicated that both substrates produced high concn. of ethanol during batch fermentation resulting in low productivity of cells. Glucose from tapioca flour gave a productivity of 0.42 g/l/h, and commercial glucose of 0.461 g/l/h. Use of an exponential fed-batch system gave max. volumetric productivity of cell mass while maximizing the cell yield, compared to the conventional batch process. SRA

BIOTECHNOLOGY

30

Kok (EJ), Reynaerts (A) and Kuiper (HA). **Novel food products from genetically modified plants: Do they need additional food safety regulations?.** *Trends in Food Science and Technology* 4(2); 1993; 42-48

The need for additional food safety regulations for genetically modified plant products (tomatoes with extended shelf-life, insect resistant tomatoes); research strategies that have been used in the risk evaluation of genetically modified products; insight into the basic immunological processes are reviewed. 22 references. GS

31

Kanawjia (SK), Jha (A) and Singh (S). **Biotechnological developments of flavour and colour in food processing.** *Beverage and Food World* 20(4); 1993; 30-32

Aspects discussed in this article are flavour and fragrance chemicals (methyl ketones, diacetyl, lactones, butyric acid, isovaleric acid, terpenes, sequiterpenoids), complex flavour and aroma products (dairy flavours, bread flavours, mushroom flavours), production of flavour chemicals by plant tissue culture, evaluation of products and colourings. SRA

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colourants

32

Collins (TFX), Black (TN), O'Donnell (MWJr), Shackelford (ME) and Bulhack (P).

Teratogenic potential of FD and C Red No. 3 when given in drinking water. *Food and Chemical Toxicology* 31(3); 1993; 161-167

FD and C Red No. 3 (Erythrosine), a common food additive was administered (0.05, 0.1, 0.2 or 0.4% dosing sol. in distilled water and corresponding daily doses of 64, 121, 248 and 472 mg FD and C Red No. 3/kg body wt.) to pregnant Osborn-Mendel rats to study its teratogenic potential. No dose-related teratogenesis was seen. FD and C Red No. 3 was neither foetotoxic nor teratogenic at the dose levels tested in drinking water. BV

CEREALS

33

Jood (S) and Kapoor (AC). **Protein and uric acid contents of cereal grains as affected by insect infestation.** *Food Chemistry* 46(2); 1993; 143-146

Wheat, maize and sorghum with 25, 50 and 75% infestation caused by *Trogoderma granarium* Everts and *Rhizopertha dominica* Fabricus separately and in mixed population were analysed at 1, 2 and 4 months of storage. Results indicated substantial reductions in protein nitrogen and true protein contents in 3 cereal grains at 75% level infestation, but the reductions was non-significant at 25 and 50% levels of grain infestation. Variations in nitrogenous compounds during storage of 1, 2 and 4 months were marginal. Both insect sp. produced uric acid above acceptable limits (10 mg/100 g) even at 50% infestation levels of 3 cereal grains. SD

34

Morrison (WR), Law (RV) and Snape (CE). **Evidence for inclusion complexes of lipids with V-amylose in maize, rice and oat starches.** *Journal of Cereal Science* 18(2); 1993; 107-109

Non waxy maize, rice and oat starches contained amylose-lipid inclusion complexes. In barley starches a fraction of the amylose is fully saturated with lipid while the rest is lipid free. Lipids in non-waxy cereal starches contained over 60% *cis*-unsaturated fatty acids and when isolated, they were viscous liquids at ambient temp. GS

Barley

35

Macri (LJ), Mac Gregor (AW), Schroeder (SW) and Bazin (SL). **Detection of limit dextrinase inhibition in barley.** *Journal of Cereal Science* 18(2); 1993; 103-106

Two proteins have been isolated from barley (*Hordeum vulgare* cv. Harrington) that inhibit limit dextrinase from germinated barley. These inhibitors were purified by carboxymethyl cellulose ion exchange chromatography and chromatofocusing. They were shown to have approx. $M_{r/s}$ of 15k and isoelectric points of approx. 6.7 and 7.2 (measured by isoelectric focusing). AA

Oats

36

Guth (H) and Grosch (W). **Odourants of extrusion products of oat-meal. Changes during storage.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3); 1993; 22-28

Aroma extract dilution analysis of a fresh extrusion product (EP) of oat meal showed 25 odorants of which hexanal (I) octanal, *trans*-2-3- epoxyoctanal, (II) (E,E)-2, 4-nonadienal, (III) (E,E)-2,4-decadienal, (IV) *trans*-4,5-epoxy-(E)-2-decenal, (V) 4-hydroxy-2-nonenoic acid lactone (VI) and vanillin (VII) appeared with high FD factors. Compounds I to IV and caproic acid (VIII), which increased during storage of EP, were quantified by an isotope dilution assay. Soaking the EP in water liberated expecially VII from starch inclusion complexes; its concn (mg/kg) which was determined after methylene chloride extraction increased from 0.09 to 6.7. During storage of EP in closed bags at 22°C the levels (mg/kg) of I and VIII increased, causing a rancid off-flavour: 0 d, 0.51, 1.9 VIII; 35 d, 1.2 I, 10.4 VIII; 9.6 I, 11.3 VIII. AA

37

Autio (K), Malkki (Y) and Virtanen (T). **Effects of processing on the microstructure of oat (*Avena sativa*) bran concentrate and the physicochemical properties of isolated β-glucans.** *Food Structure* 11(1); 1992; 47-54

Microstructure of oat cell walls during concn. of oat bran and isolation of β-glucans was studied using fluorescence microscopy. Oat bran concentrate from cv. Nasta had higher β-glucan content and viscosity of crude extract than from the commercial bran mixture. Nasta bran conc. contained intact aleurone and subaleurone layers while the commercial bran concentrate large portions of endosperm cell walls. The commercial bran mixture contained β-glucan degrading enzymes which survived the entire isolation procedure but was effectively inactivated heating at 78°C with 80% ethanol. The solubility and recovery of β-glucan improved in the presence of enzymes in the extraction step and viscosity decreased when measured at the same β-glucan concn. SD

Rice

38

Amanatullah (AZ), Dawlatana (M), Nurannabi (BI) and Bhuiyan (MZH). **Studies on expansion and swelling qualities of rice.** *Bangaldesh Journal of Scientific and Industrial Research* 27(3/4); 1992; 1-8

Three var. of paddy (BR_4, BR_5 and BR_6) were parboiled according to the traditional method. The cooking time, expansion and swelling ratios of raw and parboiled samples of 3 var. of rice were analysed. Parboiled rice required more cooking time than raw rice to attain softness and BR_5 var. needed the least cooking time. Parboiling decreased the length and increased the breadth of the grain. The expansion and swelling ratios of raw rice was higher than that of parboiled rice, in all the samples. GS

39

Eggum (BO), Juliano (BO), Perez (CM) and Acedo (EF). **The resistant starch, undigestible energy and undigestible protein contents of raw and cooked milled rice.** *Journal of Cereal Science* 18(2); 1993; 159-170

The *in vitro* and *in vivo* resistant-starch (measured in growing rats) levels were low in five raw rice cvs different in apparent amylose content, and the values were correlated positively with amylose content. Cooked and cooked parboiled rices generally had higher resistant-starch contents than raw rices, particularly those with intermediate gelatinization temp. starches, but waxy rice had very low values. Values for undigestible energy, which is mainly in the form of unfermented energy and undigestible protein, were similar in raw rices, but increased with processing, particularly in the higher-amylose rices. *In vivo* resistant starch was not correlated significantly with undigestible energy and undigestible protein, but undigestible energy and protein were correlated with each other. Parboiling was calculated to increase the resistant-starch content of cooked rice by not more than 1%. Thus, cv differences in cooked-starch digestibility were reflected less in levels of resistant starch than in the rate of starch digestion as indicated by glycaemic and insulin response. AA

Rye

40

Javabainen (P) and Linko (Y-Y). **Factors affecting rye sour dough fermentation with mixed-culture preferment of lactic and propionic acid bacteria.** *Journal of Cereal Science* 18(2); 1993; 171-185

Results of the study show that the dough yield and temp. were the most dominating factors affecting the second-degree polynomial models to describe dependent output variables during rye dough acidification. For rye sour dough fermentation a dough yield of 320%, temp. of 35°C and amount of pre-ferment of 32% (rye flour wt. basis) gave the highest propionic acid concn. of 0.55 g/100 g sour dough with the pre-ferment of *L. brevis* together with *P. acidi propionici*. Titratable acidity values of about 27 to 35 ml 0.1 M NaOH/5g flour, indicative of medium to strong sour rye dough were obtained and the lactic to acetic acid molar ratio of 1.9 to 4.0 were within the optimal range. A pH < 4 and a typical titratable acidity of about 16 (ml 0.1 M NaOH/5 g flour) of fermented sour were obtained usually in 17 to 24 h with both bacteria combinations used in the pre-ferment. The mixed culture pre-ferment of lactic and propionic acid bacteria thus appeared to be a potential alternative along with traditional starters used in rye sour dough fermentation, with an improved mould-free bread shelf-life through an increased propionate level generated *in situ*. GS

Wheat

41

Patel (KP), Valand (VM) and Patel (SN). **Powder of neem-seed kernel for control of lesser grainborer (*Rhizopertha dominica*) in wheat (*Triticum aestivum*).** *Indian Journal of Agricultural Sciences* 63(11); 1993; 754-755

1 day old *R. dominica* were released in wheat mixed with neem-kernel powder at 1, 2, 3, 4 and 5% levels. Emergence of adult and grain damage were recorded at 32, 64 and 96 days. Insect population increased significantly with passage of time but the adult population was min. in seeds treated with 5% neem kernel powder and the insect population increase was 13.46, 30.69 and 58.67 (retransformed values) after 32, 64 and 96 days respectively. The seed damage at 5% level was 15.49% after 96 days whereas it was 29.81% in control. KAR

42

Gruppen (H), Kormelink (FJM) and Voragen (AGJ). **Water-unextractable cell wall material from wheat flour. 3. A structural model for arabinoxylans.** *Journal of Cereal Science* 18(2); 1993; 111-128

Water-unextractable wheat flour arabinoxylans were degraded with purified endo (1-4)-β-D-xylanases and a (1-4)-β-D-arabinoxylan arabinofuranohydrolase from *Aspergillus awamori* in order to elucidate their structural features. The arabinoxylan fragments obtained were characterized and quantified using Bio-Gel P-2 chromatography in combination with high-performance anion-exchange chromatography. A model is proposed, based on the results obtained, in which arabinoxylans are envisaged as containing highly-branched regions, mostly consisting of tetrameric repeating units of an unsubstituted and a double arabinofuranosylated xylose residue interlinked with less-branched regions, which include subregions containing up to 7 contiguous unsubstituted xylose residues. The highly-branched regions are enriched in both O-2,3 disubstituted, as well as O-2 monosubstituted, xylose residues. The latter are absent in the less-branched regions. Variation in arabinose/xylose ratio between different arabinoxylan populations is due to variation in the relative proportion, as well as the composition, of the less-branched regions. In general, water-unextractable arabinoxylans are degraded by the purified xylanases to a lesser extent than water-extractable arabinoxylans with similar arabinose/xylose ratios and glycosidic linkage compositions. AA

43

Gruppen (H), Kormelink (FJM) and Voragen (AGJ). **Enzymic degradation of water-unextractable cell wall material and arabinoxylans from wheat flour.** *Journal of Cereal Science* 18(2); 1993; 129-143

mifferences were investigated in the enzymic breakdown of water-unextractable cell wall material (WUS) of wheat flour by endoxylanase I (endoI) and endoxylanase III (endoI III) purified from *Aspergillus awamori*. The degradation by these enzymes of water-extracted and alkali-extracted arabionxylans was also examined. Both enzymes released in total 90% of the arabinoxylans present in the WUS, without solubilization of glucomanns, (1-3, 1-4)-β-glucans and cellulose. Both poly- and oligo saccharides were released during the incubation. Arabinoxylans with similar arabinose/xylose ratios, obtained from different fraction of the WUS, showed different degrees of degradation. No differences could be observed in enzymic solubilization and degradation between WUS and alkali-extracted arabinoxylans from different wheat cvs. Compared with endoI, incubation with endoIII resulted in a more rapid solubilization and/or degradation of WUS and extracted arabinoxylans. EndoIII digestion resulted also in a more rapid decrease in the total water-holding capacity of the residual WUS, although, when the water-holding capacity was expressed on a per gram of residual WUS basis, a two-fold increase was observed as a result of enzyme incubation. Application of endoIII in baking trials yielded a 14% increase in loaf vol., together with an improvement in crumb structure and 'break and shred', whereas endoI yielded only a 4% increase of loaf vol. with no improvement of other baking characteristics. AA

44

Rouau (X). **Investigations into the effects of an enzyme preparation for baking on wheat flour dough preparation.** *Journal of Cereal Science* 18(2); 1993; 145-157

The modification of pentosans in doughs by fungal enzyme Grindamyl S 100, used as flour improver, is reported. In the absence of added enzyme 15-20% of water-unextractable anhydro-arabinose plus anhydro-xylose (ara + xyl) were solubilized during dough processing, depending on the starting flour used. At the optimal dosage, the enzyme preparation broughtout a further (ara + xyl) solubilization of 9-29%. The liberation of arabinoxylans modified the viscosity of water extracts from the doughs. The specific viscosities of extracts from enzyme-treated doughs were much enhanced (approx. 40-65%) as compared to the control, because the av. apparent intrinsic viscosity of extracted arabinoxylans (both water extractable and enzyme-released) remained high. GS

45

Confronti (FD), Johnson (JM) and Alley (M). **The effects of nitrogen fertilization and chlorination on the protein and fatty acid contents of soft red winter wheat flour, and their influence on the baking quality for angel food cake.** *Journal of Cereal Science* 18(2); 1993; 187-195

Soft red winter wheat (Coker 916) was subjected to varying N-fertilization levels and portions of the milled product were chlorinated. Increased application levels of N-fertilization had a significant effect ($P < 0.05$) on protein and unsaturated fatty acid (18:1, 18:2; 18:3) content. Use of chlorinated flour improved the physical characteristics of the angel food cake. A change in the ratio of uneven-to even cake cells produced a rounder and closer packed crumb matrix, which also contributed to a lower vol. cake. The improvement in the crumb texture and increase in cell evenness was correlated negatively ($r = -0.84$) with a decrease in linolenic acid content after chlorination. Chlorination of flour caused increase in cake hardness. Baking quality of chlorinated soft wheat flour improved with the combined effect of protein and fatty acid content. GS

Wheat flour

46

Timmermann (F), Voudouris-Tsoukala (M) and Belitz (H-D). **Aseptic proteinases in wheat flour. I. Characterization.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(1); 1993; 5-11 (De)

Different proteolytic activities were determined in rye flour and in several wheat flours in relation to the wheat var. and the substrates used (azocasein, protamine sulphate, haemoglobin and benzoyl arginine nitroanilide). Endopeptidases with activity against azocasein exhibited a pH optimum of 5.0 and a temp. optimum of 58°C. They were completely inhibited by pepstatin, whereas EDTA showed only a minor inhibitory effect. Bivalent cations activated the enzymes slightly. The activity of the enzymes was also inhibited by pepstatin using the substrates haemoglobin. B-chain insulin and glucagon. The data obtained show that the enzymes belong to the aspartic proteinases. AA

47

Timmermann (F) and Belitz (H-D). **Aspartic proteinases in wheat flour. II. Enrichment.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196 (1); 1993; 12-16 (De)

Proteinases in wheat flour, which are active against azocasein at pH 5.0 and inhibited by pepstatin, were enriched by precipitation with ammonium sulphate, affinity chromatography on haemoglobin Sepharose 4B and ion exchange chromatography on carboxymethylallulose. The crude enzyme preparation delivered 11 active fractions on carrier-free isoelectric focusing in the pH range 4.76-5.66. The two main peaks exhibited isolectric points of 5.05 and 5.24 respectively, and were free of exoproteolytic activities. The amino acid compositions of the active fractions were similar and characterized by about 50 mol% of Glu, Gly and Ser. AA

48

Timmermann (F) and Belitz (H-D). **Aspartic proteinases in wheat flour. III. Effect on dough and gluten.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(1); 1993; 17-21 (De)

Only 25% of the aspartic proteinases of wheat flour are extractable with water. Therefore the main part of these enzymes remains in the gluten during washingout of dough. For characterizing the effect of the aspartic proteinases on gluten proteins, a homogenate of gluten in dilute acetic acid was incubated at pH 3.0. After incubation for different times the gluten suspension was separated into soluble and insoluble fractions by the addition of NaCl. Load extension tests of the control showed that the viscoelastic properties of the NaCl-insoluble fraction corresponded to the starting material. With increasing incubation time a decrease in max. resistance and an increase in extensibility was observed. Incubation in the presence of pepstatin caused only minor changes. Therefore exopeptidases are without effect. An influence of gluten deamination can also be excluded. The same effects (decrease of max. resistance, increase in extensibility) were observed with dough and could be stopped also by addition of pepstatin. The amount of the NaCl-soluble fraction of gluten increased during incubation of gluten without pepstatin. Its amino acid composition changed with incubation time from an albumin-like to a glutenin-like pattern. AA

MILLETS

Corn

49

Vickers (Z) and Roberts (A). **Liking of popcorn containing different levels of salt.** *Journal of Sensory Studiės* 8(2); 1993; 83-99

Low, medium and high salt level unflavoured samples were evaluated by 300 panelists for overall liking, salt intensity and salt liking in repeat sessions. Liking score decreased after eating a 3-cup serving. Sensory specific satiety for different salt levels was not found. Consuming low salt popcorn increased the saltiness rating while consuming high salt popcorn decreased the same. When the panelists retasted the samples at least one day later overall liking for high salt sample increased but the increase was less than that for medium and low salt samples. Questionnaire measurements of popcorn liking and frequency of consumption (time 1, during 3 cup serving) were poorly related to measurements of liking or changes in liking obtained in repeat evaluations (time 2, immediately after time 1, and time 3, 1 day or 7 days later than time 1). SD

50

Winkelmann (DL) and Listman (GM). **Corn in the developing world and the international maize and wheat improvement center.** *Food Reviews International* 9(2); 1993; 315-349

Review. 5 references. SRA

PULSES

51

de Lumen (BO). **Molecular strategies to improve protein quality and reduce flatulence in legumes: A review.** *Food Structure* 11(1); 1992; 33-46

Molecular approaches to improving protein quality and reducing flatulence in beans are reviewed. The regulation of seed-specific expression and organisation of seed storage protein genes are known. Similar techniques designed to increase the methionine content of tobacco seeds using hetrologus seed protein genes from peas, common bean and soybean, could be adopted to modify lysine, tryptophan and threonine in cereals and legumes. Through the study of molecular biology of carbohydrate and lipid metabolism in the developing seed it may be possible to improve the digestibility of proteins and starch, alter fatty acid composition and minimize formation of undesirable flavours. Similarly by the application of suitable genetic engineering it may be possible to improve the usefulness of legumes and other plant seeds as food sources with no adverse effect on seed biology. 147 references. SD

52

Chander (H) and Berry (SK). **Control of insect infestation in *Wadian* (traditional savoury preparation) by sorbic acid.** *Beverage and Food World* 20(2); 1993; 28-29

Sorbic acid at 1 and 2% concn. (W/W) in mung and urd Wadian was evaluated for checking infestation by *Rhyzopertha dominica* (F) and *Stegobium paniceum* (L.) during storage. Percent adult mortality of both the insects in treated wadian samples did not differ much from their respective untreated control at both the storage intervals. Sorbic acid mixed at 1% concn. could supress the progeny of *R. dominica* by 88.9 and 83.6% and that of *S. paniceum* by 90.0 and 93.3% in mung and urd wadian respectively even after 3 months' storage. Sorbic acid incorporation even at 2% concn. was found not to affect the taste of the cooked wadian to any perceptible extent and The treated wadian retained their natural colour. AA

Beans

53

Bressani (R). **Grain quality of common beans.** *Food Reviews International* 9(2); 1993; 237-297

This review discusses the importance of arriving at grain quality characteristics in food grain legumes, an activity which requires the participation of breeders, agronomists, food scientists and nutritionists. Other aspects covered are components of grain quality of common beans, effect of processing (moist cooking, dry-thermic processing, germination, fermentation, dehulling and milling, irradiation), acceptability characteristics (physical aspects of grain, factors related to post-harvest biochemistry, handling, and storage), nutritional factors (positive attributes, negative attributes: antinutritional factors, nutrient bioavailability), food products (preparation of bean ingredients and utilization in food products). 40 references. SRA

Cowpeas

54

McWatters (KH), Resurreccion (AVA), Fletcher (SM), Peisher (AV) and Andress (EL). **Physical and sensory characteristics of akara (fried cowpea paste) made from whole and decorticated cowpeas (*Vigna unguiculata*).** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 157-161

The preparation of akara, a popular West African food made from whipped cowpea paste, traditionally involves decortication (seed coat removal). Decortication may not be necessary for consumers who are unfamilar with product characteristics. Akara was prepared from meal processed from whole or decorticated seeds. Paste from whole seeds was more viscous and dense than decorticated and produced fewer balls per batch. Akara from whole seeds required significantly more force to shear-compress and had a darker, duller colour than akara from decorticated seeds. Akara from both processes contained 22% protein, which was more than twice that of fried cornmeal hush puppies and French fried potatoes. Sensory quality was evaluated by 128 Georgia teenagers. Appearance and colour ratings were significantly higher for the decorticated product, there was no difference in flavour, mouthfeel or overall quality ratings due to decortication. AA

Kidney beans

55

Coffey (DG), Uebersax (MA), Hosefield (GL) and Bennink (MR). **Stability of red kidney bean lectin.** *Journal of Food Biochemistry* 16(1); 1992; 43-57

Lectins are toxic heat-stable glycoproteins, termed phytohemagglutinins, that depress the nutritional quality of *Phaseolus vulgaris*. Purified phytohemagglutinin (PHA-P) was separated from dark red kidney beans (Montcalm cv) by affinity chromatography and subjected to various treatments including:

thermal (70-100°C; chemical (2 M NaCl, 5 M urea, 5% mercaptoethanol, pH 12 and pH 3) and enzymatic (peptidases, proteases and carbohydrases). At 70°C, the PHA-P activity decreased with a linear response. Exposure to pH 12 or 5 M urea were the most effective chemical treatments for reducing hemagglutinating activity. Treatment with proteases resulted in 88-98% reductions in PHA-P activity. Mannosidase treatment resulted in a slight but significant ($P < 0.01$) reduction in activity; however, amylases and neuraminidase had no effect on activity. Terminal sialic acid residues may not be an important determinant of PHA-P activity. AA

Leucaena leucocephala

56

Sethi (P) and Kulkarni (PR). **In vitro protein digestibility of *Leucaena leucocephala* seed kernels and protein isolate.** *Food Chemistry* 46(2); 1993; 159-162

Autoclaving appreciably improved the *in vitro* digestibility of *Leucaena* seed kernel meal. Digestibility of *Leucaena* protein isolate increased compared to raw seed kernels due to the removal of antinutritional factors, particularly immunosine in the non-precipitable supernatant (whey) fraction. SD

Navy beans

57

Redden (RJ),Isaacs (AR), Varley (H), Greaves (F) and Lee (S). **Canning quality of navy beans varieties.** *Food Australia* 45(1); 1993; 73-79

This paper describes genetic variation for canning quality and the development of criteria to assess canning quality in new breeding lines. Field trails were conducted over 8 yrs from 1983-1991. Canning quality was assessed on selected navy bean cvs grown in regional trials each yr, at both irrigated and rainfed locations until 1985. In 1988 a comprehensive evaluation was established to conduct canning tests in preliminary advanced and regional trails, from both irrigated and rainfed growing conditions. A two-stage selection program with 6 yrs per cycle and canning tests over the last three, produced good quality selections from mediocre original parents, indicating the success of a simplified subjective test for canning quality. SRA

OILSEEDS AND NUTS

Coconuts

58

Hurtada (WA) and Raymundo (LC). **Storage stability of dehydrated young coconut kernel ("Buko").** *ASEAN Food Journal* 7(4); 1992; 189-195

The effectiveness of sulphiting, antioxidant and packaging (double laminate bags or Al pouch) material in prolonging the shelf-life of dehydrated buko kernel was evaluated. Dried kernel from 7-8 month old coconut was dehydrated after sulphiting and treatment with vitamin E, packed and stored for 6 months under ambient conditions. The study showed that vitamin E treated dehydrated 'buko' strips packaged in Al pouches at room temp. was the best product and remained stable for 6 months. SRA

Groundnuts

59

Abdullah (A), Resurreccion (AVA) and Beuchat (LR). **Formulation and evaluation of a peanut milk based whipped topping using response surface methodology.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 162-166

Using a rotatable design for two factors, 13 formulations of whipped topping were prepared containing 40% peanut milk as a source of protein. Whipped toppings were subjected to sensory evaluation using descriptive analysis. Colour, overrun, viscosity and syneresis were analysed. Peanut-based whipped toppings were generally white and glossy with slightly stiff foam and fine, uniform air cells. There were significant differences in foam stiffness, uniformity of size of air cells and sweetness of various topping formulations. The physicochemical characteristics of formulated peanut-based whipped toppings were similar to those of commercially available whipped toppings. AA

60

Nigam (SN Ed). **Groundnut - a global perspective. Proceedings of an international workshop. 25-29 Nov 1991, Andhra Pradesh.** 539; 1992

Major papers presented at the proceedings are on production and trade of groundnuts, regional reviews, donor reports, special topics including information transfer, processing and products, integrated post management, genetic sources - including wild species, biotechnology and crop modeling. Nearly 100 poster abstracts are included. These cover general topics, genetic resources, biotechnology, breeding, crop physiology and nutrition, diseases and insect pests, intercropping and weed management processing and products. The proceedings provide a comprehensive record of progress made in groundnut research and production technology in the 1980's. The workshop recommendations, originating from disciplinary group discussions, outline the future research requirements of the crop. CSA

Nutmeg

61

McKee (LH), Thompson (LD) and Harden (ML). **Effect of three grinding methods on some properties of nutmeg.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 121-125

The particle size, composition and antioxidant capacity of nutmeg ground by ambient, chilled and liquid nitrogen methods were studied. About 70% of nutmeg ground by each of the 3 methods was classified as 'medium' particle size. Grinding method did not affect moisture content, which averaged 6.8%. Nutmeg ground by the ambient method had a higher percentage of steam volatile oil (5.8%) than nutmeg ground by the chilled (5.5%) and liquid N (5.3%) methods. The % of oleoresin in nutmeg ground under ambient conditions varied widely from batch to batch, while nutmeg ground by the liquid N method had a more consistent batch-to-batch % of oleoresin. A series of standard solutions was prepared from pure nutmeg oleoresin and a colour equivalent was calculated for each sample to indicate the amount of colour compound in the sample relative to the standard curve. The colour equivalent of nutmeg ground by the liquid nitrogen method (0.969 g/100 mL) was higher than that for nutmeg ground by the chilled (0.748 g/100 ml) and ambient (0.902 g/100 mL) methods. The addition of 2.5% nutmeg was found to have a slight antioxidant effect when tested in a model salad dressing formula. AA

Soybeans

Soy products

62

Hung (TV), Jiang (HH), Drew (PG) and Black (RG). **Characterisation of yeasts and bacteria in lupin-soy-sauce fermentation.** *ASEAN Food Journal* 8(3); 1993; 99-104

A soy sauce supplemented with lupin flour or flakes (30%) was prepared using *Aspergillus oryzae* and microorganisms derived from a raw soy sauce originating from China. The microorganisms growing in the lupin-soy sauce 2nd stage fermentation were isolated and characterized as a system consisting of *Pediococcus acidilactici*, *Bacillus licheniformis*, *B. subtilis*, *Micrococcus* spp. and *Torulopsis*. SRA

Soy flour

63

Yadav (R), Mital (BK) and Jha (YK). **Biochemical changes in defatted soy flour during storage.** *Beverage and Food World* 20(4); 1993; 11-12, 15

Commercially available defatted soy flour (DSF) samples were packed in polyethylene bags and stored in desiccators at 22 and 37°C under 57 plus or minus 2 and 80 plus or minus 1% RH for 90 days. The samples were drawn at 15 days intervals and analysed for different characteristics. DSF samples exhibited more pronounced decrease in protein, pH and increase in acidity at 80% RH and 37°C than at 57% RH and 22°C over 90 days storage. NPN content markedly increased up to 30 days under all storage condition but showed a declining trend at 22°C. At 57% RH under both storage temp. the total counts, proteolytic counts, yeast and molds increased in number upto 30 days and thereafter declined. Coliforms were not detected after 45 days. Microbial counts increased at 80% RH at both temp. throughout the storage. SRA

TUBERS AND VEGETABLES

Onions

64

Randle (WM) and Bussard (ML). **Streamlining onion pungency analyses.** *Hortscience* 28(1); 1993; 60

A method is reported for evaluating onion pungency that reduces time and cost. This new method decreased the time required to process a single bulb from 78 (standard method) to 19 min. and thereby increased the likelihood that chemical analysis can be used in onion breeding programs when selecting for pungency. SRA

Sweet potatoes

65

Walter (WMJr) and Schwartz (SJ). **Controlled heat processing of jewel sweet potatoes for puree production.** *Journal of Food Quality* 16(2); 1993; 71-80

'Jewel' sweet-potato slices 0.5 cm thick were precooked at 100, 125 and 150°C for varying periods of time, and finish cooked for 15 min at 150°C and pureed. Puree from 100°C, 6 min precook treatment was similar to puree from baked sweet potatoes (1.25 h at 195°C) in chemical and physical characteristics. Sensory panel clearly distinguished the two purees but were divided in respect of preference. Heat processed puree showed higher maltose, lower starch content while baked control puree showed decrease starch mol. size and viscosity, having been more completely hydrolysed. SD

Vegetables

66

Seow (CC), Ng (KB) and Bourne (MC). **Effect of blanching treatments on physico-chemical properties of dehydrated carrots, celery and green beans.** *ASEAN Food Journal* 7(4); 1992; 184-188

This study indicated that higher rates of dehydration and rehydration, greater rehydration ratios, and firmer texture of the rehydrated products were obtained with low temp. long time/high temp. short time - blanched materials than with materials blanched using the conventional single stage high temp. short time method. SRA

67

Shinohara (K). **Desmutagenicity of vegetables and fruits.** *JARQ (Japan Agricultural Research Quarterly)* 26(1); 1992; 62-66

Aqueous dialyzates from various kinds of vegetables and fruits such as spinach, broccoli, egg-plant and apple inhibited the mutagenicity of Trp-P-2 toward *Salmonella typhimurium* TA 100 and TA 98, and the desmutagenicity was retained even after heating at 100°C for 20 min. Dialyzates of burdock, eggplant, spinach and apple also inhibited the mutagenicity of Trp-Ps, benzo-[a]-pyrene, sterigmatocystin, aflatoxin B1, 2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide and N-methyl-N'-nitro-N-nitrosoguanidine. It was suggested that desmutagenic principles of apple and spinach be polymerized polyphenol fractions and relatively high mol. wt. components, respectively. AA

Leafy vegetables

68

Chauhan (SK) and Sharma (RC). **Development of instant dehydrated saag.** *Beverage and Food World* 20(4); 1993; 25-26

Instant dehydrated *saag* was prepared from blends of mustard (*Brassica compestris*), spinach (*Spinacia oleraceae*), fenugreek (*Trigonella focnumgraccum*) and turnip

(Brassica rapa) with onion, garlic, ginger, cardamom, Cinnamon, red chillies, turmeric, jaggery and maize flour. Fully cooked material along with spices, salt was homogenised and dried (moisture 10%) and packed were stored at room temp. for 12 months. The reconstituted saag was comparable with freshly cooked saag in consistency, flavour and taste. SRA

FRUITS

69

Alzamora (SM), Tapia (MS), Argaiz (A) and Welli (J). **Application of combined methods technology in minimally processed fruits.** *Food Research International* 26(2); 1993; 125-130

This paper presents the processes developed for preserving 'high moisture fruit products' (peach, pineapple, mango, papaya, chicozapote, banana) in 7 countries in the frame of CYTED-D program. The new technologies were based on the combination of a mild heat treatment, a slight a_w reduction, and addition of antimicrobials ('hurdle effect'). These minimal processes are energy efficient, satisfactory to preserve fruits *in situ* and open new possibilities for export markets. High moisture fruit products are shelf-stable during at least 4-8 months of storage. AA

70

Proceedings of national symposium on export of fruits, vegetables and floricultural products. 7th - 8th April 1992, New Delhi. 226; 1992

Technical papers covered in this proceedings are export status and potential of horticultural produce by Patnaik, G. (pp 19-28); how to enter into export trade of fruits, vegetables and floricultural products by Dattatreyulu, M. (pp 29-47); research efforts in promoting export of fruits, vegetables and flowers from India by Chadha, K. L. (pp 49-63); export of fruits, vegetables to European markets by Singh, R. N. (pp 117-121); pesticides in foods and regulatory measures by Chadha, D. S. (pp 123-129); pesticides residues on fresh fruits and vegetables for export by Aswathi, M. D. (pp 131-136); transportation of perishable by air-facilities at airports by Nair, P. S. (pp 145-150); carrying perishables: the multimodel way by Malik, P. S. and Gupta, A. K. (pp 151-154); transportation of fruits, vegetables and floricultural products by ocean freight by Sawhney, R. P. (pp 155-158); packaging requirements of fresh produce for export by Bhowmik, S. R. (pp 159-177); transportation of fruits, vegetables and horticultural products by ocean freight by Bhansali, R. K. (pp 179-186). CSA

71

Prestamo (G) and Manzano (P). **Peroxidases of selected fruits and vegetables and the possible use of ascorbic acid as an antioxidant.** *Hortscience* 28(1); 1993; 48-50

The various isoenzymes of peroxidase were determined in potato (*Solanum tuberosum* L.), carrot (*Daucus carota* L.), tomato (*Lycopersicon esculentum* Mill), Kiwifruit (*Actinidia deliciosa* A. chev.), cauliflower (*Brassica oleracea*), green beans (*Phaseolus vulgaris* L.), and horseradish (*Armoracia rusticana* Gaertin, Mey Scherb). There was only one isoenzyme in cauliflower (70 kDa), two in Kiwifruit (45-43 kDa), and a range of isoenzymes (120-36 kDa) in horseradish. Between 2 and 170 μm ascorbic acid was required to inhibit peroxidase activity (PA) completely in all assayed extracts. As more ascorbic acid was added, the PA reaction was delayed 75-120 min. SRA

Apples

72

Hansen (K) and Poll (L). **Conversion of L-isoleucine into 2-methylbut-2-enyl esters in apples.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 178-180

Intact 'Golden Delicious' apples (Malus domestica, Borkh.) were infiltrated with a L-isoleucine sol. to investigate its conversion into volatile esters. It was found that the L-isoleucine treatment caused an increased production of 2-methylbut-2-enyl esters, especially the acetate ester, but also of ethyl 2/3-methylbutanoate, 2/3-methylbutanol and most 2/3 methylbutyl esters. AA

73

Hough (G), Chirife (J) and Marini (C). **A simple model for osmotic dehydration of apples.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 151-156

A model was developed for osmotic dehydration of fruit which takes into account outgoing water, incoming solute and shrinkage of fruit during the process. The model was experimentally verified by lab. dehydration of apple slices using 55 g/100 g glucose syrup at 45°C. The model adequately described experimental results in terms of lost water, gained solids, reduction of a_w and shrinkage during osmosis. By fitting the model to experimental values, apparent diffusivity values at 45°C for outgoing water and incoming sugar were 1.9×10^{-10} and 1.5×10^{-10} m^2/s, respectively. AA

Apricots

74

Sharma (KD) and Sharma (PC). **Some product from wild apricot grown in dry temperature regions of Himachal Pradesh.** *Beverage and Food World* 20(4); 1993; 22-23

A brief account of preparation of different products from wild apricot for its profitable utilization is presented. Aspects include, fruit characteristics, preparation of processed products (jam, mixed fruit jam, chutney, squash, drink, toffee and powder). SRA

Ber

75

Chavan (UD), Adsule (RN) and Kadam (SS). **Processing of ber. III. Preparation of dried ber powder and tuty-fruity.** *Beverage and Food World* 20(4); 1993; 28-29

A process for drying of ber fruits has been developed. In this process, the ber fruits were blanched in hot water for 2-3 min followed by sulphiting at 2 g sulphur/kg fruit. They were dried at 60°C for 40-48 h, packed and sealed. This could be eaten as such or after reconstitution in 40% sugar sol. Fruits can also be powdered and used in different bakery products. Ber fruits can be used in preparation of tuty-fruity, where fruits are cut to small cubes, and added with sugar and acetic acid during syruping process. This can be used in bakery and other products. SRA

Cherimoya

76

Palma (T), Stanley (DW), Aguilera (JM) and Zoffoli (JP). **Respiratory behaviour of cherimoya (*Annona cherimola* Mill) under controlled atmospheres.** *Hortscience* 28(6); 1993; 647-649

Respiration rates of 'Concha Lisa' cherimoyas at 10°C were monitored in a flow-through system using O_2 consumption and CO_2 production under 5, 10, 15 or 20% O_2 atm. A typical climacteric rise was observed 15 days after harvest under normal (20% O_2) atm., while this event was delayed in 10 and 15% O_2. Fruits kept in 5% O_2 did not show a detectable climacteric rise and did not produce ethylene. All fruits ripened normally after being transfered to air storage at 20°C; however, the time needed to reach an edible condition differed with treatment and was inversely proportional to O_2 content. Study suggests that 'Concha Lisa' cherimoyas can be maintained at 10°C with 5% O_2 for upto 43 days and still ripen normally and remain acceptable after 4 days at room temp. SRA

Citrus

77

Garcia-Viguera (C), Tomas-Barberan (FA), Ferreres (F), Artes (F) and Tomas-Lorente (F). **Determination of citrus jams genuineness by flavonoid analysis.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 255-259

An easy technique that enables the analysis of flavonoids from citrus jams is described. The flavonoids from commercial sour orange, sweet orange, mandarin, lemon, bitter lemon, grapefruit and lime jams were analysed by HPLC. Each citrus jam has a characteristic flavonoid pattern that can be used in genuineness detn. Commercial jams produced with mixtures of orange, lemon and grapefruit can easily be characterized by HPLC. No differences between the flavonoid profiles of natural fruits and those of the corresponding jams were observed, showing that the manufacturing process does not affect the flavonoid profile and, therefore, that this profile can be used in genuineness studies. AA

Figs

78

Bruland (HG), Matthiaschk (G), Sanitz (W), Vierkotter (S), Weber (R), Wenzel (H). **A sampling plan for a screeening of aflatoxins in dried figs.** *Deutsche Lebensmittel-Rundschau* 88(6); 1992; 183-185 (De)

Grapefruits

79

McDonald (RE), Nordby (HE) and McCollum (TG). **Epicuticular wax morphology and composition are related to grapefruit chilling injury.** *Hortscience* 28(4); 1993; 311-312

Differences in chilling injury (CI) susceptibility between 'Marsh' grapefruit (*Citrus paradisi* Macf.) from interior and exterior tree canopy positions were analysed to investigate the hypothesis that epicuticular wax morphology and composition influence CI development during storage at 5°C for 5 wks and 80 to 92% RH. Interior canopy fruit had significantly less CI than exterior canopy fruit. Similarly, shaded surface of fruit from the exterior canopy had significantly less CI than sunexposed surfaces. Components of the epicuticular wax, in decreasing order of abundance, were terpenoids, aldehydes, hydrocarbons and alcohols. Hydrocarbons (n-alkanes) were significantly less abundant in the epicuticular wax on shaded and interior fruit surfaces, respectively. Study indicated that the morphology and composition of crystalline wax are influenced strongly by canopy position. SRA

Grapes

80

Dhillon (WS), Bindra (AS), Cheema (SS) and Sohan Singh. **Note on effect of berry thinning on quality of grapes cv. Perlette.** *Indian Journal of Horticulture* 49(1); 1992; 50-52

Berry thinning from the clusters of vines was adjusted 20, 40, 60 and 80% levels. Increasing berry removal significantly decreased shot-berry %. Shot berries increased from 0.6% to 2.6, 8.2, 16.6 and 29.5% with removal of 60, 40, 20% and in control respectively. A significant fall in TSS was observed when berry removal reduced from 80 - 20%. Highest TSS (17.8%) was recorded under 80% berry thinning, and lowest (13.9%) under control. Highly significant lower acidity was observed in berry thinning when compared to no berry removal. Max. fruit acidity of 0.83% was found in control and min. of 0.47% under 80% berry removal. Thus 40% berry removal produced bunches of acceptable size and quality. SRA

Litchi

81

Roychoudhury (R), Kabir (J), Dutta Ray (SK) and Dhua (RS). **Effect of calcium on fruit quality of litchi.** *Indian Journal of Horticulture* 49(1); 1992; 27-30

Horticultural Research Station, Mondouri, India, carried out pre-harvest sprays of 1.0% Ca as $Ca(NO_3)_2$ and 0.6% Ca as $CaCl_2$ using tween 20 as spreader on 7 different replicated trees, each treatment at 20 and 10 days before harvest of litchi Bombai cv. Fruits harvested at 58 days of fruitset were stored at 29-32.5°C ambient temp. and 69-78.5% RH using litchi leaves as packing material in bamboo basket. Fruit wt., length, diam., sp. gr., peel and stone wt., biochemical constituents, titratable acidity, ascorbic acid content were analysed. Pre-harvest sprays of 0.6% $CaCl_2$ improved fruit wt. and aril %, pulp:peel and pulp:stone ratio. Fruit quality in terms of TSS, total and reducing sugar was much better in $Ca(NO_3)_2$ sprayed fruits while TSS:acid and sugar:acid ratio was more with $CaCl_2$ spray as $Ca(NO_3)_2$ treatment developed more acidity. Ascorbic acid content was higher in $Ca(NO_3)_2$ treated fruits. SRA

82

Yuniarti and Suhardi. **Ripening retardation of Arumanis mango.** *ASEAN Food Journal* 7(4); 1992; 207-208

Arumanis mango harvested at optimal picking maturity were treated with: (1) 2, 4, 6 or 8% $CaCl_2$ sol., (2) 4, 5, 6 or 7% wax emulsion, (3) wrapping in perforated polyethylene bags with 2.5, 5.0, 7.5 or 10% $KMnO_4$ added, (4) wrapping in sealed polyethylene bags with 2.5, 5.0, 7.5 or 10% $KMnO_4$ added, and (5) control with no dipping or wrapping. Mangoes treated with (4) showed retarded ripening more than the other treatments. In (3) treated mangoes ripening was retarded only for 1-3 days. The wax emulsion at 6-7% had the greatest effect in retarding ripening. $CaCl_2$ treatment was less effective. After 19 days at room temp. the control fruit was not suitable for consumption. SRA

83

McCollum (TG), D'Avino (S) and McDonald (RE). **Heat treatment inhibits mango chilling injury.** *Hortscience* 28(3); 1993; 197-198

'Keitt' mango (*Mangifera indica* L.) were kept at 38°C for 0, 24 or 48 h before storage at 5°C for 11 days. During this storage period non-heated mango fruit developed severe chilling injury (CI), which was manifested as rind discoloration and pitting. Heating significantly reduced CI. Non-heated fruit produced a transient burst of ethylene evolution following transfer to 21°C. Heated fruit did not produce similar burst. Non-heated and heated fruit ripened in normal pattern as indicated by changes in firmness, colour and composition. Study indicated that mango tolerance to chilling temp. may increase after pre-storage heat treatment. SRA

84

Grag (N), Kalra (SK) and Tandon (DK). **Quality evaluation of market raw mango powder and mango leather.** *Beverage and Food World* 20(2); 1993; 13-14, 18

Raw mango powder and mango leather available in Lucknow market and lab. samples (control) were evaluated for their physico-chemical and microbiological quality. The moisture content was lower in commercial samples than lab. samples. TSS and acidity were higher in market samples than in control. Mango leather from market and control showed similar features except vitamin C and colour where the latter was found superior with a lower colour value of 0.32%. Bacterial and fungal loads in commercial samples varied between 10^1 to 10^4 cfu/g irrespective of type of packing due to improper handling. The lab. samples were free from any bacterial contamination. Significant fungal counts (*Lepidopterous*, *Colleoptrous* and *Aspergillus*) were observed in lab. samples, since they were 1 yr old with high TSS and sugar. This study suggests a need for improved technology of processing and automization in the industry to upgrade quality of products. SRA

85

Charanjit Kaur and Khurdiya (DS). **Studies on mango sauce.** *Beverage and Food World* 20(4); 1993; 24-26

Mango sauce was manufactured from mature and ripe Dashehari mangoes at lab. level varying ratio of fruit and cane sugar were tried as 2:1, 4:1, 6:1 with corresponding acidities of 0.3, 0.5 and 0.7% respectively. The resultant sauce was evaluated. The overall sensory quality score of mango sauce increased with the increasing amount of cane sugar. A max. score of 7.75 was observed in the 2:1 ratio of mango and canesugar prepared from unripe mango. In the sauce from ripe fruits, the ratios 4:1 and 2:1 were found best. The ratio 2:1 with 0.5% acidity scored the highest. SRA

86

Yeun (CMC), Tan (SC), Joyce (D) and Chettri (P). **Effect of post harvest calcium and polymeric films on ripening and peel in Kensington pride mango.** *ASEAN Food Journal* 8(3); 1993; 110-113

This investigation showed that ripening in mangoes can be significantly slowed with postharvest application of 2-8% $CaCl_2$, either under 32-115 kPa pressure respectively. The level of peel injury resulting from Ca treatment was reduced by the use of polymeric film packaging or by treating warm fruit in warm Ca sol. SRA

Mosambi

87

Kumar (R) and Ganapathy (MM). **Performance of mosambi on different rootstocks.** *Indian Journal of Horticulture* 49(3); 1992; 222-226

The performance of sweet orange cv. Mosambi viz *Troyer citrange*, *Carrizo citrange*, *Rubidoux trifoliate*, *Pomeroy trifoliate*, Rough lemon (*Citrus jambhiri* Lush), Kodakithuli, Cleopatra (*Citrus reshni* Tan.) and Rangpur lime (*Citrus limonia* Osbeck) on various root stocks under rainfed conditions of Chotanagpur (plateau region), Bihar, India, was studied. Tree growth was significantly higher in *T. citrange* followed by Rough lemon and *C. citrange*. In general, increasing trend of yield was observed with *T. citrange*, *C. citrange* and Rough lemon upto 9th yr. Rough lemon recorded the highest % juice. *R. trifoliate*, *P. trifoliate*, *Cleopatra mandarin* and *C. citrange* rootstocks produced max. % of TS. *C. xitrange* proved as the best rootstock followed by Rough lemon and *T. citrange*. SRA

Muskmelon

88

Artes (F), Escriche (AJ), Martinez (JA) and Marin (JG). **Quality factors in four varieties of melon (Cucumis melo, L.).** *Journal of Food Quality* 16(2); 1993; 91-100

Four spanish var. of muskmelon (piel de Sapo, Amarillo, Galia and Tendral)were studied for quality characteristics at harvest. Var. Piel de Sapo showed max wt., caliber, edible portion and was the most oval shaped; Amarillo had max soluble solids, non-reducing sugars and the lowest respiration rate, Galia showed lowest wt., pulp firmness, acidity, max. reducing and non-reducing sugars, mineral nutrients and was the most spherical shape and Tendral showed max values of peel thickness, pulp firmness, acidity, respiration rate and lowest values of soluble solids and mineral nutrients. SD

Peaches

89

Chanana (YR), Nijjar (GS), Kanwar (JS), Kaundal (GS), Brar (SS), Deol (IS). **Studies on the performance of a new peach cultivar suitable for sub-tropics.** *Indian Journal of Horticulture* 49(1); 1992; 37-39

Punjab Agricultural University, Ludhiana, India, collected data during 1987-90 on flowering, fruit set, fruit wt., maturity, yield and quality of Flordasun and TA-170 peach var. introduced from Florida, USA. There was no difference in dates of flowering in both var. TA-170 having distinct earliness in ripening by 1 wk., better keeping and shipping quality, and relative resistance to fruitfly in comparison to Flordasun, appears to be suitable for sub-tropical climates. SRA

90

Gradziel (TM), Beres (W), Doyle (J) and Weeks (C). **'Rizzi': A processing Clingstone peach with extended postharvest storage potential.** *Hortscience* 28(3); 1993; 230

'Rizzi' Clingstone peach (*Prunus persica* (L.) Batsch) is a 'late' season processing peach with extended postharvest storage potential. 'Rizzi' compares favourably with that of 'Ross' and 'Dr. Davis', which are the recognized standards for processing peaches. Fresh fruit held in air storage for 8 wks at 0°C and 90% to 95% RH have a high quality processed product. BV

91

Cantor (S), Meredith (FI) and Wicker (L). **Postharvest changes of pectic substances in chilled peaches.** *Journal of Food Biochemistry* 16(1); 1992; 15-29

Red globe peaches were harvested at the threshold-mature stage and either stored at 0°C after preripening at 20°C for 48 h or stored directly at 2°C. Total pectin increased from 7.49 mg/g fresh wt. in the threshold-mature sample to 10.21 mg/g in pre-ripened fruit stored at 0°C and 12.83 mg/g in fruits stored directly at 2°C. Depending on extraction and storage protocol, between 26% and 73% of total pectin was solubilized. Chelator-soluble fractions had a low degree of esterification (DE ca. 20%), whereas other fractions were highly methylated (DE ca. 56% to 74%). Average DE did not vary between samples. DEAE-cellulose chromatography revealed an uneven distribution of methyoxyl groups. Two prominent peaks were observed in chromatograms of chelator-soluble extracts from threshold-mature fruit and fruit stored directly at 2°C. One peak was observed in chelator-soluble pectin from preripened fruit stored at 0°C. AA

Strawberries

92

Collins (JK) and Perkins-Veazie (P). **Postharvest changes in strawberry fruit stored under simulated retail display conditions.** *Journal of Food Quality* 16(2); 1993; 133-143

'Cardinal' strawberry fruit were placed in plastic boxes with plastic dome lids (PDL) or with polyethylene wrap (PE), warmed to 25°C for 8 h and stored at 1°C or 5°C to stimulate retail storage temp. conditions. For all treatments, fruit held at 5°C decayed and deteriorated more than fruit held at 1°C. During storage at 1°C or 5°C, fruit in boxes with PE accumulated CO_2 (0.75 - 2% CO_2/mg), had less wt. loss and better colour retention than fruit in boxes with PDL. After 3 days of storage, precooled strawberries exposed to 8 h of warming had more wt. loss and worse appearance than fruit held continuously at 1°C; these differences were not apparent after 7 days. AA

CONFECTIONERY, STARCH AND SUGAR

Starch

93

Kramholler (B), Pischetsrieder (M) and Severin (T). **Maillard reactions of dextrin and starch.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 227-229

When dextrins or starch are heated with propylamine in neutral aqueous sol. at 100-130°C a brown colouration is observed. From the reaction mixture 3-hydroxy-2-methyl-1-propyl- 4(1H)-pyridone 11, 1,4-dihydro-2-methyl-1-propyl-4-propylimino-3-pyridinol 12 and 5-hydroxymethyl- 1-propyl-pyrrol-2-aldehyde 13 can be extracted with organic solvents and separated by HPLC. Enzymatic hydrolysis effects the release of 1(3-hydroxy-1-propyl-2-pyrrolyl)-1-ethanone 10 from a glycosidically bound precusor. AA

Sugar

94

Bhatt (S). **Separation of fructose from carbohydrate mixtures. I. Non-chromatographic methods.** *Indian Sugar* 43(7); 1993; 463-468

Fructose is obtained from glucose-fructose mixtures like high fructose corn syrup or invert sugar by non-chromatographic methods based on the differences in the physical, chemical or biochemical properties of the 2 sugars. Selective crystallization of sugars, calcium fructosate precipitation, selective chemical transformation of glucose (selective oxidation of glucose to gluconic acid, selective conversion of glucose to furanic polyalcohols), biochemical separations (enzymatic oxidation of glucose, selective fermentation of glucose), and reverse osmosis are important aspects in the non-chromatographic methods. SRA

95

Purnomo (H). **Sugar components of coconut sugar in Indonesia.** *ASEAN Food Journal* 7(4); 1992; 200-201

This study indicated that sucrose (70-79%) was the major component of all samples (from Malang, Yogyakarta and Denpasar) of coconut sugar, followed by glucose (3%) and fructose (9%). Variations in sugars (75-88%) between samples were observed due to slightly different procedures used from one region to another or the different raw material quality. SRA

Sugarcanes

96

Singh (AP), Billore (SD) and Chatterjee (A). **Biophysical-chemical and economical evaluation of sugarcane (*Saccharum officinarum*) hybrids.** *Indian Sugar* 43(7); 1993; 471-475

Field trial from 1986-88 to 1990-92 on 8 sugarcane hybrids (CoJn 79-81, 80-120, 80-141, 80-14, 80-116, 80-151, 82-585, 82-600) and the local check Co 6304 were conducted as autumn planting. Hybrids Cojn 80-151 showed max. cane sugar yield, sucrose % and was most stable, energy efficient and economical for autumn planting in Vindhyan Plateau, India. SRA

97

Billore (SD), Bargale (M) and Singh (AP). **Sugar and sugarcane production and their utility dynamics in 2000 A.D.** *Indian Sugar* 43(7); 1993; 477-479

Data on production of sugar, gur, and khandsari were regressed to obtain linear growth rate, coefficient of variation and expected production in 2000 A.D. In 2000 A.D. the production of sugarcane in the country would be 286406.90 thousand t., out of which 159432, 37610.70 and 89364.20 thousand t. would be used for sugar, gur and khandsari respectively. The ultimate sugar production would be 16042.50 thousand t. with per capita consumption of sugar and gur and khandsari 21.17 and 7.07 kg/annum respectively. SRA

BAKERY PRODUCTS

98

VIII Indian convention of food scientists and technologists on recent develpments and future trends in milling and baking technology. 10-12 May 1990, Mysore.132; 1990

Abstracts of papers presented at the posters session are covered under the following topics: analytical methods, confectionery, dairy science, fats and oils, food presevation, fruits, vegetables and plantation products, grain science and storage, machinery, milling and baking, meat, fish and poultry, microbiology, nutrition and waste utilization. CSA

Bread

99

Frasse (P), Lambert (S), Richard-Molard (D) and Chiron (H). **The influence of fermentation on volatile compounds in French bread dough.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 126-132

The influence of the fermentation on the neutral/basic volatile fraction of the French bread dough was investigated. Three types of dough were compared by GC-MS and GC/olfactometry analysis of the corresponding aromatic extracts obtained by vacuum desportion: (YF) control dough obtained by the straight dough method, (YNF) yeasted but not fermented dough (which was conditioned just after the mixing step) and (NYF) not yeasted but fermented dough (like the control one but without incorporation of the baking yeast in the system). more than 40 components were identified among with 20 alcohols, 7 esters, 6 lactones, 6 aldehydes, 3 alcanes and 1 sulphur compound. Except for the aldehydes and the alcanes, all these classes of compounds increased with the activity of the yeast *Saccharomyces cerevisiae* [from (NYF) to (YF)], notably the alcohols due to the formation of fusel alcohols. The 2,3 butanedione, 3-methyl-1-butanol, 2-methyl-1-butanol, methional, 2-phenyl ethanol and two unidentified components with a pungent and a mushroom-like odour, were the most odourant compounds generated during the fermentation of the dough, as shown by the aroma extract dilution analysis of the 3 aromatic extracts. AA

100

Qarooni (J), Posner (ES) and Ponte (JGJr). **Production of tanoor bread with hard white and other U.S. wheats.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 100-106

A small-scale test baking procedure and a scoring system were developed to evaluate the suitability of U.S. wheats for the production of tanoor bread (a single-layered, flat bread). Eleven wheat samples (hard white winter, hard red winter and soft white winter) were milled to 85% extraction and made into tanoor bread. The data for flour quality and bread scores were subjected to correlation and stepwise regression analyses. Flour protein quality and starch relative viscosity measured by the rapid visco-analyser were highly correlated with many aspects of bread quality. The quadratic function of the valorimeter value and relative viscosity on the bread quality indicated that extremes in dough strength and starch relative viscosity adversely influence the quality of tanoor bread. The results of this study indicated that optimum tanoor bread was produced from flour (85% extraction) of 11.0 to 13.0 g/100 g protein. AA

101

Qarooni (J), Posner (ES) and Ponte (JGJr). **Production of pita bread with hard white and other U.S. wheats.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 93-99

Fifteen samples of U.S. wheats (hard white winter, hard red winter, hard white spring and soft white winter) were milled to flour of 80% extraction and made into pita bread (two-layered, flat bread). The best quality product was obtained from flour samples of 9.5 to 12.0 g/100 g protein. Extremes in protein content adversely influenced the product quality. The flour (80% extraction) quality data and individual scores of bread quality were subjected to correlation and stepwise regression analyses. The latter identified the flour quality characteristics that influenced the individual and overall bread scores. The total score of pita bread was found to be influenced by the quadratic function of starch relative viscosity measured by the rapid visco-analyser. AA

Cookies

102

Idris (NA), Abdullah (A) and Embong (MS). **Texture characteristics of pressed cookies based on palm oil shortenings.** *ASEAN Food Journal* 7(4); 1992; 202-204

In this study the textural attributes of cookies made using palm oil (PO), hydrogenated palm oil (HPO), and interesterfied palm oil (IEPO) shortenings were examined. Shortenings made of PO had good consistency with a yield value of 260 g/cm^2 and were hard more gritty, and spreadable cookies made of HPO had higher solids content than PO and IEPO. Cookies from IEPO shortenings was significantly ($P < 0.5$) less hard than from those based on PO and HPO. SRA

MILK AND DAIRY PRODUCTS

103

Vasavada (PC), Chandler (RE) and Hull (RR). **Evolving methodologies for microbiological examination of milk and dairy foods.** *Dairy, Food and Environmental Sanitation* 13(9); 1993; 510-515

Some of the concepts and instrumental approaches to microbiological analysis and modifications of several conventional tests currently finding acceptance in dairy microbiology lab. are discussed in this article. Aspects covered are rapid methods and automation in microbiology, adjuncts to conventional methods, instrumental methods for detection of microbial growth and metabolism, rapid quick screening method, rapid detection, characterization and identification of pathogens, toxins, and residues, and predictive microbiology. SRA

Milk

104

Moustafa (SI) and Marth (EH). **Occurrence of *Escherichia coli*, *Pseudomonas aeruginosa* and *Listeria monocytogenes* in abnormal milk.** *Dairy, Food and Environmental Sanitation* 13(2); 1993; 70-73

Results of the California Mastitis Test indicated that milk from 94 of 195 (48%) samples was abnormal, suggesting the possibility of mastitis. Of the 94 positive samples, 27, 26, 17 and 24 respectively came from the right front, right rear, left rear, and left front quarters. Isolates of *E. coli* were serotyped and were serogroup O. A;O *E. coli* isolates were sensitive to ampicillin, carbencillin, cephalothin, erythromycin and tetracycline. None of the isolates was sensitive to gentamycin, neomycin and streptomycin. The 2 isolates of *Ps. aeruginosa* were sensitive to carbenicillin and tobramycin and both were resistant to gentamycin. One of the two isolates was sensitive to ampicillin and pipevacillin. *L. monocytogenes* was not recovered from the milk samples. SRA

105

Mistry (VV), Hassan (HN) and Robinson (DJ). **Effect of lactic and protein on the microstructure of dried milk.** *Food Structure* 11(1); 1992; 73-82

SEM showed that powder particles with the highest lactose had wrinkled surface and dents; powder particles with lower lactose including ultrafiltered and diafiltered milk powders only dents without wrinkles. Diafiltered skim milk with 0.9% lactose raised to 15.6% by addition of lactose powder and then spray dried showed only a wrinkled surface. Permeate powder with 82.8% lactose had smooth particles with some wrinkles. Lactose and protein in milk powder influence the surface structure. SD

106

Sharma (SK), Hill (AR) and Mittal (GS). **Effect of milk concentration, pH and temperature on aggregation kinetics and coagulation properties of ultrafiltered (UF) milk.** *Food Research International* 26(2); 1993; 81-87

Aggregation kinetics of renneted ultrafiltered (UF) milk were monitored by measuring the complex viscosity ($\mu^{\bullet}$) at various times with a Nametre viscometer. The rate of aggregation increased with an increase in milk concn. (1X-4X) and temp. (28-37°C) and a decrease in pH (6.8-6.0). The coagulation time (CT) decreased with a decrease in pH from 6.8 to 6.0 and with an increase in temp. The CT decreased with an increase in milk concn. when milk pH was adjusted (7.0), but remained unaffected when pH was adjusted by adding lactic acid (6.8-6.0). The curd firmness index increased with an increase in both milk concn. and temp., and with a decrease in pH. The aggregation kinetics suitably followed the Scott-Blair and Burnett model ($\mu^{\bullet} = \mu^{\bullet}$ exp $(-\lambda/t^{\bullet})$), where $\mu^{\bullet}$ = limiting value of $\mu^{\bullet}$, cP; λ = time at which $\mu^{\bullet} = \mu^{\bullet}/e$, min and $t^{\bullet}$ = time after aggregation, min. AA

Milk products

107

Richardson (NJ), Booth (DA) and Stanley (NL). **Effect of homogenization and fat content on oral perception of low and high viscosity model creams.** *Journal of Sensory Studies* 8(2); 1993; 133-143

Assessed under low-intensity red illumination, homogenized and thickened higher fat milk samples evoked higher sensory ratings of creaminess than did the unhomogenized or lower-fat milks that had not been thickened to the viscosity of double cream. Furthermore, perceptual ratings of fat content showed the same dependency on homogenization, higher fat and thickness and were entirely accounted for by the creaminess ratings. This indicates that assessors recognize the type of milk or cream most similar to a rated standard and infer its fat content on the basis of tactile patterns produced in the mouth by forces at the surface of small and even-sized dairy fat globules when bulk forces are produced by sufficient viscosity. AA

Cheese

108

Heisserer (DM) and Chambers (EIV). **Determination of the sensory flavour attributes of aged natural cheese.** *Journal of Sensory Studies* 8(2); 1993; 121-132

An expert descriptive panel identified, defined and referenced 30 flavour attributes which described with a few exception significant differences among the 42 cheese amples. Attributes common to all samples, those common to most of the samples and those which are specific to some of the samples were clearly understood. The results of the factor analysis indicated that no one factor solution best described the data. Substantial reduction of the number of attributes to adequately describe natural cheese flavour was not feasible. SD

109

Jack (FR), Piggott (JR) and Paterson (A). **Discrimination of texture and appearance in Cheddar cheese using customer free-choice profiling.** *Journal of Sensory Studies* 8(2); 1993; 167-176

Free-choice profiling was easy and effective to discriminate quality difference, particularly texture and appearance, in Cheddar cheese samples evaluated by a consumer panel. In appearance factor colour played an important role; also hard, dry, crumbly samples were discriminated from soft, smooth samples and mature texture being sticky, wet were discriminated from immature texture with rubbery characteristics. SD

110

Taneya (S), Izutsu (T), Kimura (T) and Shioya (T). **Structure and rheology of string cheese.** *Food Structure* 11(1); 1992; 61-71

The rheological properties of cheese curds being highly dependent on temp., their flowability lost below 35°C, strong cheese manufacture process is prefered above that temp. Cheese curd being incompressible viscoelastic body, the relationship between shear rate and stress was well represented by the power law equation. The stringiness is well defined by a area of the fibrous material that appears when the cheese is torn because of the breakage of the protein matrix arranged in the longitudinal direction, the release of water and fat dispersed within the matrix. Cheese curd network consisting of casein subunits was clear at 5.4 pH. SD

111

Parashar (SC) and Jha (YK). **Development of vegetarian cheese from buffalo milk blended with soy milk using fungal rennet.** *Beverage and Food World* 20(2); 1993; 23-25, 27

Vegetarian cheese was made from milk containing 10, 20 and 30% soy milk with Marzyme, cheese having 10% and 20% soy milk with Marzyme, cheese having 10% and 20% soy milk were rated superior than control samples. Cheese samples containing 10 to 20% soy milk showed higher glycolysis, proteolysis and lipolysis than control samples. AA

Blue cheese

112

Gonzalez de Llano (D), Ramos (M) and Martin-Alvarez (PJ). **Comparative study of different methods for evaluating proteolysis in blue cheese.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(1); 1993; 29-31

Methods of evaluating proteolysis using different precipitants and nitrogen evaluation methods were assessed. The coefficient of detn. (R^2) values relating the various methods and the ripening period were positive and > 0.87. Amino acid nitrogen in the fraction soluble in 12% trichloroacetic acid had the highest coefficient value ($R^2 = 0.95$). Of all the methods for evaluating N, dialysis had the highest value of R^2 with respect to water-soluble nitrogen determined using the Kjedahl method. However, dialysis is not applicable to blue cheeses with high mould contents. Cluster analysis was applied to the ripening index values and yielded groupings according to the method of nitrogen evaluation. AA

Cheddar cheese

113

Jordan (KN) and Cogan (TM). **Identification and growth of non-starter lactic acid bacteria in Irish Cheddar cheese.** *Irish Journal of Agricultural and Food Research* 32(1); 1993; 47-55

A set of 160 isolates of non-starter lactic acid bacteria (NSLAB) from 8 commercial Cheddar cheeses were classified as *Lactobacillus curvatus* (23 strains), *L. plantarum* (45 strains), *L. casei* (89 strains) and heterofermentative lactobacilli (3 strains). No pediococci were found. All strains of *L. curvatus* required tryptone for growth in milk and Tween 80 for growth in broth. Most strains (82%) of *L. plantarum* metabolized citrate. The total amounts of lactate produced by *L. casei* and *L. plantarum* in milk averaged 8.2 (s.d. 1.94) and 4.9 s.d. 1.94) and 4.9 (s.d. 2.18 g/l, respectively. Sixty-nine out of 77 strains tested (representing all 3 species) grew in 6% salt while 45 strains grew in 8% salt. NSLAB had an average generation time of 8.5 days in cheese ripened at 6°C. Citrate uilization occurred in only one or four cheeses examined but considerable variation in the levels of lactose occurred during ripening. AA

Goat cheese

114

Mor-Mur (M), Carretero (C), Pla (R) and Guamis (B). **A survey on the microbiological quality of a semi-soft on-farm manufactured goat cheese.** *Food Microbiology* 9(4); 1992; 345-352

The microbiological quality of a 60 day ripened, on-farm manufactured, semi-soft, mixed coagulation cheese was evaluated. Samples from 42 cheeses were analysed for their aerobic mesophilic counts, lactic acid bacteria in 3 solid media (MRS Agar, M17 Agar and MSE Agar), yeasts and moulds, psychotrophs, *Enterobacteriaceae*, coliforms and faecal coliforms, coagulase-positive staphylococci, sulphite-reducing clostridia and *Salmonella* spp. The aerobic mesophile bacteria constituted the largest group of microorganisms found. The largest number of lactic acid bacteria was obtained with MRS Agar; M17 Agar and MSE Agar gave similar counts although the latter was generally lower. The mean log cfu g^{-1} of psychrotrophic microorganisms was 4.77 and for moulds and yeasts 4.30. 13, 25 and 45.8% of the samples were found negative for entrobacteria, coliforms and coagulase-positive staphylococci, respectively. Sulphite-reducing clostridia, faecal coliforms and *Salmonella* was not detected. The mean pH of the samples was 4.07 plus or minus 0.5. AA

Mozzarella cheese

115

Latha Sabikhi and Kanawjia (SK). **Effect of type of acids on the quality of Mozzarella cheese manufactured from admixture of goat and buffalo milks.** *Indian Journal of Dairy Science* 46(1); 1993; 17-20

The effect of acetic, lactic and hydrochloric acids on sensory, physico-chemical, rheological and textural properties of Mozzarella cheese manufactured from an admixture of goat and buffalo milks (1:1 ratio) were studied. The av. scores for flavour were 8.03, 8.37 and 8.87 for cheese made with acetic, lactic and hydrochloric acids respectively. The max. of 4.73 for body and texture was for the cheese made from hydrochloric acid and the least of 3.87 for lactic acid. The av. score for appearance was 2.60 for lactic acid, 2.73 for acetic acid and 2.90 for hydrochloric acid. Max. fat recovery (92.45) was in cheese made from acetic acid. The hydrochloric acid was found to be the most suitable acidulant for production of good quality Mozzarella cheese. SRA

Ice cream

116

Caldwell (KB), Goff (HD) and Stanley (DN). **A low-temperature scanning electron microscopy study of ice cream. I. Technique and general microstructure.** *Food Structure* 11(1); 1992; 1-9

LT-SEM revealed 4 distinct structural phases viz ice crystals, air bubbles, fat globules and serum. Air bubbles 10-60 µm diam. were lined with fat globules; Ice crystals, 40 µm mean dia. showed a characteristic reticulate structure after sublimation which greatly influenced the appearance of the ice-cream micrographs. SD

117

Caldwell (KB), Goff (HD) and Stanley (DW). **A low-temperature scanning electron microscopy study of ice cream. II. Influence of selected ingredients and processes.** *Food Structure* 11(1); 1992; 11-23

The effect of incorporation of polysaccharide stabilizers, freezing rates and storage times and temp. on microstructure was studied. Ice crystals and air bubbles increased in size as the freezing rate was reduced. Stabilized ice-cream initially had smaller mean ice crystal diameters than unstabilized samples and the structure was held better at fluctuating temp. SD

Milk powders

118

Ravindra Kumar, Surendra Nath (B) and Rama Murthy (MK). **An objective method for the determination of flavour development and storage stability of whole milk powder.** *Indian Journal of Dairy Science* 46(1); 1993; 30-33

A method used for the estimation of steam volatile carbonyls has been tried for its usefulness as an objective test to assess the acceptability of whole milk powder (WMP). In the method, steam distillate from WMP was collected under standard conditions and its optical density (OD) was measured at 280 nm. The results showed a highly significant correlation (r = -0.96) between the increase in OD and decrease in organoleptic scores of the powder samples. Based on these results, it is suggested that WMP which shows more than 0.05 increase from the initial value of OD or show a value of 0.12 in the case of samples whose initial OD values are not known, may not be suitable for further storage. AA

Yoghurts

119

Ajam (N), Foong (CY) and Benjamin (P). **Yoghurt production from local cow's milk in Malaysia.** *ASEAN Food Journal* 8(3); 1993; 117-121

This paper report the results of using readily available local gelling agents and fruits on the microbiological, physical and biochemical characteristics of yoghurt. Yoghurt solely made from cow's milk tended to be soft and watery and unacceptable as a snack food. Sweetening and addition of gelling agent greatly improved the hedonic rating. Addition of mango and pineapple fruits further improved flavour. Chilling of yoghurt prevented changes in texture, aroma and flavours after 2 wks storage. SRA

Milk proteins

120

Legowo (AM), Imade (T) and Hayakawa (S). **Heat-induced gelation of the mixtures of α-lactalbumin and β-lactoglobulin in the presence of glutathione.** *Food Research International* 26(2); 1993; 103-108

The optimum conditions for obtaining the max. gel strength upon heating mixtures of α-lactalbumin and β-lactoglobulin were investigated at different concn. of glutathione (reduced type) and NaCl. Gel strength was determined after heating at 80°C for 15 min at pH 6.3 and a protein concn. of 8%. Max. gel strength for mixtures of α-lactalbumin and β-lactoglobulin in the ratio of 2:8, 5:5 and 8:2 were obtained at glutathione and NaCl concn. of 0 mM, 86 mM, 43 mM and 116 mM and 83 mM, respectively. Multiple regression analysis indicated that both glutathione and NaCl contributed significantly (P less than or equal to 0.01) to gel formation. The promotion of gel formation with glutathione was postulated to result from glutathione reacting with intramolecular disulphide bonds in the α-lactalbumin and β-lactoglobulin, therby resulting in conformational changes. It was postulated that α-lactalbumin and β-lactoglobulin were interacting in the gelation of the mixed proteins. AA

121

Heelan (BA) and Corrigan (OI). **A comparison of the use of dairy proteins and synthetic polymers as emulsifying agents in the production of pharmaceutical systems.** *Irish Journal of Agricultural and Food Research* 32(1); 1993; 57-66

An adaptation of the turbidimetric technique of Pearce and Kinsella (1978) was used to determine the Emulsifying Activity Index (EAI) for sodium caseinate (SC), whey protein isolate (WPI), methyl cellulose (MC) and polyvinyl alcohol (PVA). The order of the EAI values was PVA > SC approx. WPI > MC. It was also concluded that the dairy proteins, SC and WPI, could be used in place of the synthetic emulsifying agents MC and PVA for the production of microparticles by emulsification and solvent evaporation techniques. AA

MEAT AND POULTRY

Meat

122

Buchanan (RL), Schultz (FJ), Golden (MH), Bagi (K) and Marmer (B). **Feasibility of using microbiological indicator assays to detect temperature abuse in refrigerated meat, poultry and seafood products.** *Food Microbiology* 9(4); 1992; 279-301

Twelve retail products were divided into three groups and stored at 5°C (adequate refrigeration, 12°C (moderate abuse), and 19°C (gross abuse). They were periodically sampled for aerobic plate counts (plates incubated at 28, 37 and 42°C), presumptive coliforms, confirmed coliforms, thermal tolerant coliforms. *Escherichia coli* and *Staphylococcus aureus*. No single indicator test was effective in all the food samples examined, but different assays were able to differentiate temp. abused versus adequately refrigerated samples in a number of products. SRA

123

Nordmark (B). **Recent developments in meat industry engineering.** *Food Technology in New Zealand* 28(4); 1993; 16, 19

This article briefly covers aspects on lamb boning, commercial progress, advantages, beef boning, mechanical dressing, meat tenderness, machine vision, energy and process integration and model software. SRA

124

Samoon (AH). **Flavour compounds in meat - a review.** *Beverage and Food World* 20(4); 1993; 13-15

This review analyses in detail the various aspects of meat flavour and factors affecting its perception and development in meat and meat products, with emphasis on major precursor compounds and flavour component reactions. Role of lipids, proteins and amino acids, carbohydrates and other meat constituents in development of meat flavour, effect of heat, irradiation, species variation in perception and development of meat flavour in beef, lamb and pork are discussed and several fertile areas for future research on meat flavour are highlighted. 3 references. SRA

Beef

125

Shehata (HA), Attia (EA) and Askar (A). **Improvement of the binding properties and texture of corned beef and formed beef ham.** *Deutsche Lebensmittel-Rundschau* 88(10); 1992; 318-321

126

Guth (H) and Grosch (W). **12-Methyltridecanal, a species-specific ordorant of stewed beef.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 171-177

127

Hefnawy (YA), Moustafa (SI) and Marth (EH). **Behaviour of *Listeria monocytogenes* in refrigerated and frozen ground beef and in sausage and broth with and without additives.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 167-170

128

Boakye (K) and Mittal (GS). **Changes in textural properties of beef *Longissimus dorsi* muscle during aging.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 145-150

Pork

129

Gupta (PK) and Chauhan (GS). **Bacteriological quality of some pork products.** *Beverage and Food World* 20(4); 1993; 18-20

Pig

130

Gill (CO) and Jones (T). **Assessment of the hygienic efficiencies of two commercial processes for cooling pig carcass.** *Food Microbiology* 9(4); 1992; 335-343

Swine

131

Pursel (VG) and Solomon (MB). **Alteration of carcass composition in transgenic swine.** *Food Reviews International* 9(3); 1993; 423-439

Rabbit

132

Sushil Kumar, Nair (RB) and Amla (BL). **Effect of post mortem chill and frozen storage on protein degradation of broiler rabbit muscles analysis by SDS-gel electrophoresis.** *Indian Journal of Animal Science* 63(10); 1993; 1042-1049

Biochemical variation in proteins of broiler rabbit muscles (*Longissimus dorsi* - LD; *Biceps femoris = BF) held at chill* (2-4°C) and frozen temp. (-10 to 12°C) were typed through SDS-PAGE. Electrophoretic pattern of extracts from prerigor LD and BF muscles revealed intrinsic differences between white and red muscles. The number of bands were more in LD muscle extract than in BF. Protein components of 54000 daltons just above the actin and 44000 just below the actin band observed in LD were lacking in BF. Initial 6 h chilling showed more marked influence on the banding pattern of BF muscle than that of LD muscle. The number of bands were reduced to 12 as compared to 15 bands in preaged BF muscle, possibly due to formation of actomyosin complex due to rigor mortis. The increased number of bands in 24 and 72 h aged muscles indicated degradation of proteins by endogenous enzymes. Protein band corresponding to 36000 daltons disappeared after 6 h aging and was not visible after 24 and 72 h aging in either muscle, whereas 40000 daltons band specific in preaged LD muscle also disappeared after 6 h chilling postmortem. The marked change observed in the electrophoretic pattern in 48 h frozen stored muscle was the development of 26000/27000 daltons band in both muscles might be related to postmortem tenderness parallel to well documented 30000 daltons band in cold and frozen stored chicken and beef muscles. AA

Products

Meat

133

Straub (B), Schollenberger (M), Kicherer (M), Luckas (B) and Hammes (WP). **Extraction and determination of biogenic amines in fermented sausages and other meat products using reversed-phase HPLC.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 230-232

A simple method is reported for the analysis of biogenic amines (BA) by means of reversed-phase-HPLC. The method is characterised by multi-channel UV detection (diodearray), subsequent post-column derivatization with O-phthaldialdehyde and 3-merceptopropionic acid and fluorescence detection. BA (putrescine, cadaverine, histamine, tyramine and 2-phenylethylamine) recoveries from meat products and especially fermented sausages ranged between 96 and 113% with a detection limit for amines of 0.5 mg/kg. BV

Poultry

Chickens

134

Marshall (DL), Andrews (LS), Wells (JH) and Farr (AJ). **Influence of modified atmosphere packaging on the competitive growth of *Listeria monocytogenes* and *Pseudomonas fluorescens* on precooked chicken.** *Food Microbiology* 9(4); 1992; 303-309

This study revealed that, in the presence of *Ps. fluorescens* growth of *L. monocytogenes* was stimulated at 3°C in air relative to growth alone. Little effect was noted on growth of *Ps. fluorescens* in the presence of *L. monocytogenes* at the lower temp. At 11°C growth of the spoilage bacterium was inhibited in mixed culture. Thus, both bacteria were capable of growth in the presence of each other. Slight differences were noted between growth of the bacteria either alone or in mixed culture. Modified atm. packaging generally had no effect on the interaction between two bacteria. SRA

135

Sheehy (PJA), Morrissey (PA) and Flynn (A). **Increased storage stability of chicken muscle by dietary α-tocopherol supplementation.** *Irish Journal of Agricultural and Food Research* 32(1); 1993; 67-73

Chicks were fed on diets containing 5, 25, 65 or 180 mg α-tocopheryl acetate/kg for 24 days and the stability of both raw and cooked muscle stored at 4 and -20°C determined by the thiobarbituric acid assay. Concn. of thiobarbituric acid-reacting substances (TBARS) were 4 to 10-fold higher in cooked muscle than in the corresponding raw muscle samples. TBARS concn. in cooked muscle from chicks fed on high α-tocopherol diets were significantly lower during refrigerated or frozen storage than those in muscle from chicks given low α-tocopherol. A similar protective effect of α-tocopherol supplementation was observed in raw muscle samples during frozen (-20°C), but not refrigerated (4°C), storage. The results confirm that incorporation of α-tocopherol into muscle by dietary supplementation is an effective means of prolonging the shelf-life of poultry products. AA

Quails

136

Mishra (SK), Panda (B), Mohapatra (SC) and Shrivastav (AK). **Response of genotypes to dietary protein levels for growth and carcass quality traits in Japanese quail.** *Indian Journal of Poultry Science* 28(2); 1993; 106-115

The performance of 3 genotypes of Japanese quail during 5 wk of rearing period with respect to growth and slaughter related traits as affected by protein levels of isocaloric diets is reported. Dietary and genotypic effects were significant for almost all measures of body wt., gain in wt., feed consumption, feed efficiency and eviscerated wt. Differences among genotypes accounted for the greater portion of total phenotypic variability. Diet containing 24% crude protein supplemented with methionine and lysine (0.1% each) appeared to be as efficient as the diet containing 27% crude protein to maximise the growth performance traits. Dietary effects appeared to be secondary to genotypic effects in influencing the growth traits. AA

137

Shukla (PK), Shrivastav (AK), Singh (RP) and Bedi (SPS). **Effect of dietary supplementation of manganese on egg production and egg quality of Japanese quail layer.** *Indian Journal of Poultry Science* 28(2); 1993; 116-119

The effect of 4 Mn feed levels 20, 50, 80 and 120 mg/kg on the production performance and egg quality characteristics of Japanese quails from 7th and 19th wk of age was studied. There was no change in the feed consumption, feed efficiency, egg mass, hen-day production, egg wt., body wt., albumen index, internal quality index, tibial bone wt. and shell thickness. % shell wt. was affected by the graded levels of dietary Mn, the highest being found at 80 mg/kg level. GS

Products

Chicken nuggets

138

Kondaiah (N), Anjaneyulu (ASR) and Lakshmanan (V). **Utilization of spent hen components in chicken nuggets.** *Indian Journal of Poultry Science* 28(2); 1993; 144-146

The quality of chicken nuggets, prime, choice and economy type, containing different proportions of deboned meat and by-products was studied. Emulsion stability and cooking loss were significantly affected with decrease of lean meat and increase of by-products. Choice type formulation (50% lean and 20% by-products) did not differ significantly from prime type formulation (containing no by-products). Economy type formulation showed higher cooking loss (5.1%). By-products possessed lower emulsifying capacity and binding coeff. The 3 types differed only in texture and overall palatability but were comparable in appearance, flavour, juiciness and mouth coating. Prime type nuggets were significantly better than the economy type. GS

Eggs

139

Pandey (NK), Anand (SK), Verma (SS) and Ram Gopal. **Yolk position in raw and hard cooked eggs as influenced by strain, age of egg and egg position during cooking.** *Indian Journal of Poultry Science* 28(2); 1993; 120-124

Eggs from 5 layer and 4 broiler strains were examined for yolk position at 0, 7 and 14 days of ambient and refrigerated storage respectively in raw, cooked-on-side and cooked-on-end eggs. In raw eggs, strain effect was significant for side/side ratio only at 7th day of ambient storage and for bottom/top ratio at 0 day, whereas age of egg had significant influence on bottom/top ratio in most of the strain with higher ratio at 7th day of ambient storage. In hard cooked eggs, strain or age of egg effects were not significant for side/side ratio whether cooked on-side or on-end, but age of egg significantly influenced the bottom/top ratio with higher ratio at 7th day of ambient storage in both the cooking position groups. Further, the eggs cooked on-ends had lower side/side ratio and higher bottom/top ratio than eggs from same strain and storage period cooked on-sides. Variation among breeds was significant for both the ratios only in fresh hard cooked eggs with better ratios on light than in heavy breed irrespective of cooking position. In addition, a negative relationship was obtained between Haugh unit and bottom/top ratio in both raw and hard cooked eggs. AA

140

Johari (DC), Deepak Sharma, Kataria (MC), Singh (DP) and Sharma (RD). **Time trend in egg quality traits and their inheritance in control population of white leghorn.** *Indian Journal of Poultry Science* 28(2); 1993; 137-140

263 progeny of 23 sires and 71 dams belonging to 12th generation was studied for inheritance of egg quality. Albumen index ranged from 0.085 to 0.160, yolk index from 0.390 to 0.500, Haugh unit score from 82.38 to 103.10 and shell thickness from 0.254 to 0.370 mm in different generations. Albumen index and Haugh units were found to be highly heritable. GS

141

Mahanta (JD), Dutta (DJ) and Rahman (H). **Physical quality characteristics of indigenous and Khaki Campbell duck eggs.** *Indian Journal of Poultry Science* 28(2); 1993; 147-149

Duck eggs, pati vs. Khaki Campbell, were compared for their physical characteristics. The 2 genetic groups differed significantly in egg wt., shape index, sp. gr., yolk index, shell thickness and % of albumen and yolk. Pati duck eggs had significantly higher egg wt. and shape index. Yolk index and shell thickness differed significantly but not the albumen index and Haugh unit. GS

142

Umamaheswara Rao (S), Rao (BV), Zachariah (K) and Rao (KM). **Isolation and purification of yolk IgG (YIgG) from duck eggs.** *Indian Journal of Animal Science* 63(7); 1993; 720-723

The methodology of chlorofrom extraction from duck egg-yolk was standardized. The aqueous portion of the extract was rich in IgG when subjected to salt precipitation followed by fractionation and purification by gel-filtration and ion-exchange chromatography. The identity of IgG was established by immunoelectrophoretic studies. The yolk extract was the choice of biomaterial for fractionation and recovery of fairly pure IgG. AA

SEAFOODS

143

Yogamoorthi (A) and Sivashankar (A). **India's seafood export trend and its future prospects by 2000 A.D.** *Seafood Export Journal* 25(11); 1994; 19-34

The present status of marine fish production, seafood export and their growth rate were assessed; the avenues to produce and market diversified seafood items analysed; and projects the trend of marine fish production and seafood export by 2000 A.D. GS

Oysters

144

Chaupoehuk (P) and Raksakulthai (N). **Use of papain and bromelian in the production of oyster sauce.** *ASEAN Food Journal* 7(4); 1992; 196-199

Oyster meat samples were ground and mixed in screw-capped glass bottles with papain or bromelain, at concn. of 0, 0.1, 0.3, 0.5 and 0.7% (w/w). Oyster sauces (OS) prepared from 0.7% papain or 0.3% bromelain hydrolysates supplemented with NaCl showed no significant differences in proximate composition, pH, consistency and sensory evaluation scores. Chinese watercress stir-fried with these prepared OS was more acceptable (P less than or equal to 0.05) than commercial OS. The prepared OS had shelf-life of 12 wks at room temp. in glass bottles with screw caps. BV

Squids

145

Nagashima (Y), Ebina (H), Tanaka (M) and Taguchi (T). **Effect of high hydrostatic pressure on the thermal gelation of squid mantle meat.** *Food Research International* 26(2); 1993; 119-123

High pressure treatment was applied to squid meat paste in order to improve its lower thermal gelation ability. The meat pastes were compressed at up to 1000 MPa for 20 min with hydrostatic pressure and then heated in 2 ways; heated at 90°C for 30 min (one-step heating); heated at 35°C for 30 min followed by 90°C for 30 min (two-step heating). The breaking strength value of the gel formed by the pressure (400 MPa)-one-step heating treatment was twice as high as that of thermal induced gel. On the other hand, the value for gel with two-step heating was considerably lower than that with one-step heating. The deterioration of gels with two-step heating was completely supressed by pressurization at 800 MPa for 20 min prior to heating. Pressure treatment at more than 800 MPa could inactivate protease(s) involved in proteolysis of squid mantle muscle protein. These results indicate that high pressure treatment before heating was effective in inducing thermal gelation of squid meat. AA

Fish

146

Ismail (N) and Wootton (M). **Fish salting and drying: A review.** *ASEAN Food Journal* 7(4); 1992; 175-183

Aspects covered in this review are world production of dried fish; wastage, salting, the preservative action, methods of salting (kench salting, pickling, brining), salt penetration, drying, the theory of drying and factors affecting the drying rate of salted fish (thickness, temp., air velocity, RH, fat content, salt content). 71 references. SRA

147

Alwan (SR), Buckley (DJ) and O'Connor (TP). **Silage from fish waste: chemical and microbiological aspects.** *Irish Journal of Agricultural and Food Research* 32(1); 1993; 75-81

Fresh fish waste was manufactured into fish silage using formic acid to reduce pH to 3.5. The pH remained below 4.0 for up to 30 days. The chemical composition (g/kg) of silage varied with the type of raw material; moisture 726 to 803 (mean 764); oil 3 to 71 (mean 38); ash 35 to 72 (mean 51); protein 144 to 161 (mean 147). During the first 8 days after silage manufacture, concn. of low-salt-soluble and insoluble protein fractions decreased while the non-protein nitrogen content increased. Silage viscosity continued to decrease with time up to day 15. The ensiling process caused a sharp initial decrease in the total number of bacteria, in lactic acid bacteria and in coliform species followed by a more gradual decrease up to 48 h. A comparative study of silage manufactured from flat-fish frames (A) and round-fish heads (B) at pH 3.5 or 4.5, showed chemical composition (g/kg) of 726 and 777 moisture, 70 and 3 oil; 55 and 70 ash; 149 and 150 protein for A and B respectively. Silage viscosity showed greater decreases at pH 3.5 than at 4.5. Silage manufactured from round-fish heads showed greater viscosity decreases at both pH levels. AA

148

Huang (C-H) and Hultin (HO). **Soluble and bound iron equally effect lipid oxidation of sarcoplasmic reticulum.** *Journal of Food Biochemistry* 16(1); 1992; 1-13

Iron over the range of 25-250 MUM $FeCl_3$ in the presence of ADP and histidine bound in increasing amounts to fish sarcoplasmic reticulum. Binding of Fe was not reversed either by washing in water or after oxidation of the membrane lipid. There was no difference in the rate of lipid oxidation measured as TBA-reactive substances catalyzed by Fe bound to the sarcoplasmic reticulum or by Fe in the soluble phase of the assay medium when expressed on an Fe basis. These results imply that for either bound or soluble Fe there is a common rate-determining step. In addition, soluble and bound Fe were similar with respect to both inhibiton by thiourea of their ability to catalyze lipid oxidation and their generation of hydroxyl free radicals measured by production of methane sulfinic acid from dimethyl sulfoxide in the presence of hypoxanthine and xanthine oxidase. AA

149

Chakrabarti (R). **Separation and prolongation of storage life of meat from small fish using dense media.** *ASEAN Food Journal* 8(3); 1993; 105-109

Dense media with sp. gr. 1.217-1.220 efficiently separated meat and bone from small fish. The Ca content in meat of lesser sardine in hand operated mincer was about 73 mg/100 g with av. moisture content (MC) of 78.14%, while the Ca content in meat separated by dense media was 55.0 - 60.4 mg/100 g with MC of 44.4 - 45.1%. Propionic acid in the media helped to control mould growth in separated meat and prolonged storage life up to 3-4 months at ambient temp. of 34 plus or minus 6°C. SRA

Cod

150

Dillon (R) and Patel (T). **Effect of cold smoking and storage temperatures on *Listeria monocytogenes* in inoculated cod fillets (*Gadus morhua*).** *Food Research International* 26(2); 1993; 97-101

Cod fillets samples (3) were inoculated with *L. monocytogenes* and cold smoked, vacuum-packaged and stored at 4°C for 3 wks or at -20°C for 3 months. The initial inoculation concn. were 10^5 MPN/g in trial 1, 10^6 MPN/g in trial 2 and 10^1 in trial 3. Number of the organism remained stable during smoking process increased with storage at 4°C, but decreased in cell number with storage at -20°C. Smoked seafood which are not cooked and contaminated with *L. monocytogenes* pose a health risk to consumers. BV

Hakes

151

Giannini (DH), Ciarlo (AS), Boeri (RL) and Almandos (ME). **Relationship between texture and some objective indices in frozen blocks of Argentine hake (*Merluccius hubbsi*) fillets.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 111-115

The relationship between texture of Argentine hake (*Merluccius hubbsi*) and 4 objective indices were studied at the storage temp. of -7, -15 and -32°C. The objective tests performed on samples taken from skinless fillet blocks were: centrifuge drip, salt soluble protein content, dimethylamine content and formaldehyde content. Linear relationships were obtained for the following pairs of variables: texture-salt soluble protein content and texture - centrifuge drip content. The texture-dimethylamine relationship was also linear at -32°C, but at -7 and -15°C, non-linear relationships were obtained. Because of the high degree of correlation (ranging from 0.92 and 0.98 for the different storage temp.) between dimethylamine and formaldehyde contents, the conclusions drawn from the texture-dimethylamine content relationships were also applicable to texture - formaldehyde content relationships. From the 4 objective texture indicative parameters studied, detn. of centrifuge drip was the only parameter to be considered as a useful texture indicator of frozen blocks of Argentine hake fillets, as the corresponding relationship with texture was the only one that was non-temp. dependent. AA

Mackerels

152

Suryaprakash Rao (V), Sudhakara (NS) and Punna Reddy (K). **Development and shelf-life of ready-to-serve frozen fish curry from Indian mackerel (*Rastrelliger kanagurta*).** *Indian Journal of Fisheries* 38(3); 1991; 169-172

A ready-to-serve frozen fish curry from Indian mackerel (*Rastrelliger kanagurta*) was stored at -20 plus or minus 2°C for 6 months and analysed for quality characteristics. A good correlation was observed between the sensory assessment and chemical parameters. Skinless and boneless flakes in curry were preferred over skin on and bone on steaks in curry. SRA

Salmon

153

Ohnuma (Y), Hatae (K) and Shimada (A). **Effects of curing on morphological and thermal properties of salmon-nose cartilage as vinegared dish in Japan.** *Journal of Food Biochemistry* 16(1); 1992; 31-41

Sliced salmon-nose cartilage was cured in 4% acetic acid up to 168 h. Using optical microscopy, reddish-purple colour produced by staining with toluisine-blue turned lighter during curing. This meant that the mucopolysaccharide level of cartilage matrix decreased, causing the structure of the cartilage to become porous. In addition, using scanning electron microscopy, loosenings of collagen fibers was observed after 72 h of curing, thus making the structure of the cartilage fragile. DSC thermograms showed that the denaturation temp. of the native collagen fibers was lowered and an additional peak appeared during curing. These findings lead us to suggest that the collagen in salmon-nose cartilage changes qualitatively during curing. AA

PROTEIN FOODS

Infant foods

154

Sri Sumartini and Kantasubrata (J). **Available lysine in infant food after processing.** *ASEAN Food Journal* 8(3); 1993; 114-116

The aim of this study was to evaluate the detn. of the 1-Fluoro-2,4-dinitrobenzene derivative by HPL°C when applied to infant food and its raw materials during processing and storage. The results indicated that the available lysine of the extruded materials, including infant food formula VI were 15-30% < in the corresponding raw materials. The standard error of 5-15% was higher in the presence of carbohydrate. Storage over 2 months resulted losses of lysine of the order 8-48% at ambient temp. SRA

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

155

Wucherpfennig (K). **Removing iron and copper ions out of beverages by means of selective complexing agents. Part 1. Singling out complexing agents.** *Deutsche Lebensmittel-Rundschau* 88(10); 1992; 313-317 (De)

Possibilities are shown to eliminate heavy metals with insoluble chelating agents. Yet not all of them are suited for the purpose envisioned since tests have shown that pectic acid, adsorber resins and cellulose hyphane are on the one hand not effective enough in the elimination of the heavy metals and will on the other hand change the wine's analytic numerogram or leave residues. Immobilized siderophores will bind only trivalent Fe and leave the more frequent bivalent unaffected. Other chelating resins could complex the Fe alright, but not the Cu. Well suited, it was found, are chelon resins together with imino diacetic acid as a functional group. Removal of Fe and Cu ions can be done in batches. The analytic numerogram of the chelon-resin-treated wines remained practically unaltered. AA

156

Hellin (LC), Ruiz (LG) and Revilla (AZ). **Gas chromatographic determination of sugars and polyalcohols in apple liqueurs.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(1); 1993; 49-52

This paper proposes a GC method to determine sugars and polyalcohols in apple liqueurs. The samples were prepared previously and the sugars determined as trimethylsilyl derivates. This technique enables isolation of the α and β anomeric forms of fructose, glucose and maltose. The precision and accuracy of the method has been verified. The liqueurs analysed are sweet liqueurs, as can be deduced from their high sugar content (over 100 g/L). Reducing sugars (glucose and fructose) were predominant. AA

Alcoholic beverages

Brandy

157

Gomez-Cordoves (C) and Bartolome (B). **Application of principal component analysis to simple determinations of brandies as a means of verifying quality.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 260-263

Phenolic composition of distillates aged in wood has been widely studied, thus giving rise to different standards that establish their genuineness and quality. The present paper sets out the results for classification of Spanish brandies and cognacs according to quality by applying analysis of variance and principal component analysis to the results of simple chemical (pH, phenol content) and physical (colour) detn. and/or the relationships between them. Chemical changes that occur during the aging process are related to these parameters. AA

Wines

158

Vaimakis (V) and Roussis (IG). **Must oxygenation and polyphenoloxidase inhibition and the oxidation of white wine.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 133-137

Experimental white wines were made by must oxygenation and by the addition of diethyldithiocarbamate (DDC) along with oxygen into the must. The inhibition of polyphenoloxidase activity by the addition of DDC led to white wines with high phenolic content, high browning capacity and potential development of pinking phenomenon. The experimental wines prepared by must oxygenation appeared to have low phenolic content (total phenolics, catechins and procyanidins), low absorbance at 420 nm and low value in the browning capacity test. This wine had a very good colour and good organoleptic quality even though it was not characteristic of wines from the grape var. used. The above indicate that must oxygenation can be used for removal of phenolic compounds in the production of table white wines. AA

Non-alcoholic beverages

Beer

159

Suihko (M-L), Vilpola (A) and Linko (M). **Pitching rate in high gravity brewing.** *Journal of the Institute of Brewing* 99(4); 1993; 341-346

The optimal pitching rate in high gravity worts (12-16°P) was about 0.3 g/l wet wt. (2.3×10^6 counted cells/ml) and per 1% of original wort gravity. In very high gravity worts (20-23°P) the corresponding figure was 0.4 g/l (2.9×10^6 cells/ml). Higher amounts of yeast did not improve the fermentation rate. With increased original wort gravity, flocculation of the yeast weakened and the amount of cropped yeast decreased. The viability of the crop yeast was good. In the conditions used, excessive production of acetate esters occurred only with pitching rates lower than the recommended rate. As the original wort gravity increased, more fermentable extract was metabolized to ethanol rather than utilized for yeast growth. The highest ethanol yield obtained was 10.9% (v/v). AA

Coffee

160

Ramesh (K), Joginder Singh and Goyal (GK). **Effect of stabilizers on heat stability of coffee flavoured drink during sterilization process.** *Indian Journal of Animal Science* 63(7); 1993; 785-786

The coffee flavoured milk-based sterilized drink prepared using milk samples having acidity of 0.14, 0.15, 0.16, 0.17 and 0.18% (lactic acid) at varying levels of trisodium citrate (TSC) and di-sodium hydrogen phosphate (DSHP) as stabilizers. Results revealed that the coagulation could be effectively checked by using 0.1% or more TSC. 0.02% TSC is required to prevent coagulation of the beverage when prepared with milk having 0.17% acidity. Increased quantity of TSC (0.03%) is required to achieve the heat stability in the drink compared to DSHP. BV

161

Ratnayake (WMN), Hollywood (R), O'Grady (E) and Stavric (B). **Lipid content and composition of coffee brews prepared by different methods.** *Food and Chemical Toxicology* 31(4); 1993; 263-269

The lipid content ($L^{o}C$) and composition of boiled, filtered, dripped, Turkish and espresso coffee from roasted beans of *Coffea arabica* and *C. robusta*, and of coffees prepared from different beans of instant coffee was examined. The LC varied with the method of preparation. Coffee brews filtered through filter paper contained < 7 mg lipids, those prepared by boiling without filtering and espresso coffee showed 60-160 mg lipids/150 ml cup. Coffee brew filtered through a metal screener contained 50 mg lipids/150 ml cup. Triglycerides (Tg) and diterpene alcohol ester (DAE) were the major lipid classes in coffee brewed from ground coffee beans, and ranged from 86.6 to 92.9 and 6.5 to 12.5% of total lipids, respectively. Coffee brews made from instant coffee, the levels of Tg and DAE were 96.4 - 98.5 and 1.6 - 3.6%, respectively. The LC of both regular and decaffeinated instant coffees varied slightly from one brand to the other, and ranged from 1.8 to 6.6 mg/150 ml cup. BV

Fruit juices

162

Chauhan (GS), Suresh (I) and Singh (D). **Formulation of fruit juice beverage from pulp.** *Beverage and Food World* 20(2); 1993; 17-18

Pulps and juice beverages prepared from apricot, peach and plum were analysed for total solids (TS), titratable acidity (TA), pH and viscosities. The beverage prepared with 20% pulp secured highest sensory score with a mean value of 7.75, 7.50 and 7.50, respectively for apricot, peach and plum and differed significantly ($P = 0.01$) from the beverages made from other ratio of pulp. The type of fruit did not exhibit significant difference on the acceptability of beverage. Stabilizer added samples in all beverages scored higher ($P\ 0.01$) sensory attributes. The apricot pulp showed highest values for TS, TA, viscosity and lowest pH and the peach pulp showed the contrary. SRA

Apple juices

163

Chauhan (SK), Lal (BB) and Joshi (VK). **Development of protein rich apple beverages.** *Research and Industry, India* 38(4); 1993; 227-229

Proximate composition, nutritional and sensory analysis of different blends revealed that apple juice (80%) and soy protein isolates (20%) were optimum to give a balanced, nutritious beverage, with substantially higher protein, fat, calorific value and minerals. Anti-nutritional factors like trypsin inhibition were completely lost in the product. GS

Citrus juices

164

Ulgen (N) and Ozilgen (M). **Determination of optimum pH and temperature for**

pasteurization of citrus juices by response surface methodology. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(1); 1993; 45-48

Optimization of microbial death, enzyme inactivation and vitamin C retention during pasteurization of pH-adjusted orange juice is discussed free of equipment dependent parameters such as the heating lag. The pH-temp. optimum was determined by response surface methodology in the range of 65-75°C and pH 2.5-4.0. The results implied that there was no pectinesterase activity below pH 3.5. *Leuconostoc mesenteroides* had its max and min thermal resistance at pH 3.5 and pH 2.7 respectively. For an ideal theoretical process requiring 4 log cycles of microbial reduction the optimum pasteurization conditions were 12 min at 75°C and pH 2.7. AA

Grape juices

165

Silva (JL), Ghaedian (R), Woods (F) and Garner (JO). **Physicochemical and sensory properties of muscadine grape juice and concentrates.** *Journal of Food Quality* 16(2); 1993; 81-90

Juice from bronze and red muscadines were concentrated by low-temp. vacuum evapoaration. Reconstituted juice showed inferior quality compared to single-strength counterparts. Blending conc. with single strength juice improved aroma and juiciness. Cellulases and pectinases did not alter quality except a slight increase in pH in red juice. Conc. and single-strength juice differed in colour but the reconstituted juice did not. SD

Kiwifruit juices

166

Wong (M) and Stanton (DW). **Effect of removal of amino acids and phenolic compounds on non-enzymic browning in stored kiwifruit juice concentrates.** *Lebensmittel-Wissenschaft und - Technologie* 26(2); 1993; 138-144

The effect of the removal of phenolics and amino acids, and initial oxidation of ascorbic acid on non-enzymic browning in kiwifruit juice concentrate during storage at 20°C was investigated. Kiwifruit juice was passed through cation exchange resin Dowex 50W and/or adsorbent resins Amberlite XAD-4 and XAD-2, to remove amino acids and phenolic compounds. The extent of the initial oxidation of ascorbic acid which occured during treatments was determined before concn. After the initial storage period, during which products from ascorbic acid oxidation were most reactive, the browning rates in concentrates which had approx. 90% of the amino acids removed were half that of the control. Initial oxidation of ascorbic acid led to an initially accelerated browning rate, which affected the overall browning occurring during storage. Removal of amino acids with minimal oxidation of the juice produces a kiwifruit juice concentrate with the least overall browning during storage, while removal of phenolic compounds does not appear to be beneficial procedure for the control of browning in kiwifruit juice concentrate. AA

Orange juices

167

Tepper (BJ). **Effects of a slight colour variation on consumer acceptance of orange juice.** *Journal of Sensory Studies* 8(2); 1993; 145-154

342 consumer panel did not prefer, particularly the older panelists, the green off-colour imparted juice but were not influenced on ratings of flavour or sweetness or overall liking. SD

168

Moshonas (MG), Shaw (PE) and Buslig (BS). **Retention of fresh orange juice flavour and aroma in an aqueous distillate from Valencia orange juice.** *Journal of Food Quality* 16(2); 1993; 101-108

Freshly squeezed Valencia orange juice, distilled at low temp. and reduced pressure, yielded an aqueous distillate with the necessary balance of volatile flavour and aroma constituents to retain the fresh juice characteristics. Flavour comparisons by an experienced sensory panel determined that orange juice reconstituted by combining the aqueous distillate with the residual juice solids had significantly more fresh juice character than reconstituted commercial frozen conc. orange juice; commercial not pasteurized single strength orange juice (SSOJ); pasteurized SSOJ, not from conc.; canned SSOJ, from conc.; or aseptically packed SSOJ, from conc. The panel also found no significant difference in fresh juice characteristics between freshly squeezed orange juice and distillate and residual solids recombined from the same juice sample. Fifty four volatile constituents were identified from the aqueous distillate of freshly squeezed orange juice. AA

Tea

169

Price (WE) and Spitzer (J-C). **The temperature dependence of the rate of extraction of soluble constituents of black tea.** *Food Chemistry* 46(2); 1993; 133-136

The temp. effect on the infusion of solubles from black tea leaf (Nerada, and Australian CTC tea) was assessed through UV active solubles present by spectrophotometric analysis. The activation energy of 41 kJ/mol. obtained for the infusion of solubles was higher than the literative value. The findings are consistent with the rate-determining step being the hindered diffusion of a soluble constituent through the leaf matrix. SD

170

Engelhardt (UH), Finger (A), Herzig (B) and Kuhr (S). **Determination of flavonol glycosides in black tea.** *Deutsche Lebensmittel-Rundschau* 88(3); 1992; 69-73

An HPLC method for the detn. of flavonol glycosides from tea has been developed. Compounds were extracted by methoanol and aqueous methanol (70%). Clean-up was carried out by polyamide column chromatography. Using two isocratic systems separation of 14 flavonol glycosides was possible. The black teas analysed (n = 25) had a total amount of flavonol glycosides from 0.38 to 1.7% dry wt. Teas from either the Darjeeling district or from Kenya had similar flavonol glycoside patterns while in Sri Lanka teas there were two groups. Assam teas showed different patterns. Flavonol glycoside pattern seems to be basically useful to detect geographic origin of tea samples, however additional detn. and data treatment by means of statistical methods are necessary. AA

171

Nas (S), Gokalp (HY) and Sahin (Y). **K and Ca content of fresh green tea, black tea and tea residue determined by X-ray fluoresence analysis.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(1); 1993; 32-37

X-ray fluoresence (XRF) can be successfully used for the qualitative and quantitative elemental analysis of various agricultural products. Its simplicity, high throughput and the possibility of automation make it useful for screening large number of samples. The K and Ca content of 138 samples of fresh green tea, black tea and black tea residues were determined by applying the XRF system. Such a method of mineral analysis of food products is not very common. Tea from different tea growing areas of Turkey, green tea of different shooting periods, black tea processed at different tea plants and tea residues from these black tea and tea residues after brewing were found to have ranges of 19,049-26,254 mg/kg, 21,904-26,883 mg/kg and 9,468-13,778 mg/kg, respectively. In the same samples the Ca content was determined as 3,580-4,799 mg/kg, 3,370-4,823 mg/kg, and 3,743-5,733 mg/kg, respectively. These findings were compared with the results of atomic emission techniques and it was concluded that the XRF system could be effectively used for quantitative analysis of the K and Ca content of tea samples. AA

172

Engelhardt (UH), Finger (A) and Kuhr (S). **Determination of flavone C-glycosides in tea.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 239-244

Reports HPLC method for the detn. of flavone C-glycosides (FCG) from black tea. The FCG detected were Apigenin

6-C-glucosyl-8-arabinoside, apigenin 6-C-arbinosyl, 8-C-glucoside, luteolin 6-C-glucoside, apigenin 8-C-glucoside, apigenin 6-C-glucoside and apigenin 6,8-di-C-glucoside. The FCG were quantified in a var. of teas of different origins (16 black, 2 green and 1 oolong). The total amount of the FCG were 0.48 - 2.69 g/kg dry wt. The FCG pattern of teas of different origins were similar to each other and no origin-dependent characteristics was observed. Small amounts of FCG (1.2 - 2.2 mg/g) were detected in hydrolysates of high relative mol. mass fractions (Mr > 5000) of a black tea liquor. BV

FATS AND OILS

173

Schwarz (W), Zajic (J) and Brat (J). **Investigations of the polymerization of fatty acids. I. An influence of reaction conditions on the course of polymerization process.** *FAT Science Technology* 95(7); 1993; 253-257 (De)

In the present paper some technological conditions of the polymerization of rapeseed oil fatty acids were studied. The temp., water content and pressure had determinating influence on polymerization velocity when the bentonite type of catalyst was used. With respect to yield of dimeric fatty acids water content of 1-2 wt. % and pressure 0.4 - 0.6 MPa are the most favourable values. With temp. above 160°C an increasing decarboxylation of fatty acids has taken place. AA

Oils

174

Ulberth (F) and Roubicek (D). **Evaluation of a static headspace gas chromatographic method for the determination of lipid peroxides.** *Food Chemistry* 46(2); 1993; 137-141

Thermal treatment to oil samples was given by means of air-forced oven instead of heating the oil in HS sampler. An inert atm. (N_2) in vials used for thermal treatment is necessary for reproducible results. Flame-sealed ampoules instead of crimp capped HS vials were used to avoid leakage after cooling down the hot vials. Thermostating the oil samples for 1 h at 60°C was found necessary to reach equilibrium. Headspace GC quantified the decomposed components of lipid peroxides, viz. pentane, hexanal, *trans*-2-heptenal on heating to 140°C for 30 min. The modified procedure improved the repeatability of the method. SD

Rapeseed oils

175

Drigolla (VP) and Pudel (F). **The direct hydrogenation of TOP-rapeseed oil.** *FAT Science Technology* 95(7); 1993; 241-248 (De)

This study reports about experimental examinations for the direct hydrogenation of TOP-rapeseed oil in the lab. scale with the aim of the test of various catalysts, quantitative detection of the influence of hydrogenating inhibitors in the TOP-rapeseed oil, optimization of parameters of the hydrogenating process. BV

SPICES AND CONDIMENTS

176

Shankaracharya (NB) and Raghavan (B). **Natural and synthetic flavours and their safety.** *Beverage and Food World* 20(2); 1993; 7-12

This article briefly describes: raw materials used by flavourists, sources of natural flavouring materials, synthetic and biosynthetic flavours, nomenclature and classification of flavours, flavouring, natural aromatic raw materials, natural flavouring substances, natural identical flavourinmg substances, natural with- other-natural-flavours, flavour potentiators, need for flavour legislation, flavour regulations, positive list system, negative list system, mixed list system, problems in flavour regulations, process flavours, enzyme and microbiological flavours, pyrolysis flavours, organisations and agencies working on flavour legislation and safety, F.D.A., FEMA, codex, joint expert committee on flavour additives, International organization of the flavour industry (IOFI), Geneva, the Council of Europe-Strasbourg; France, National flavour association, Food Chemical codex committee and flavour safety. SRA

Essential oils

177

Mahia (PL), Gandara (JS) and Losada (PP). **Infrared spectrophotometric determination of citral corrected for limonene interference in lemon and orange essential oils.** *Food Chemistry* 46(2); 1993; 193-197

An infrared spectrophotometric method is described to correct for interference by limonene in the detn. of citral in orange and lemon essential oils by substracting the limonene spectrum from the essential oil spectrum. The first derivative trough-to-peak distance between 1684 cm^{-1} and 1677 cm^{-1} was most reliable in determining citral, parameters of the zero order absorption spectrum (net absorbance and peak area) performed poorly in comparison. AA

Spices

Capsicum

178

Yuen (CMC) and Hoffman (H). **New capsicum varieties: Storage suitability and consumer preference.** *Food Australia* 45(4); 1993; 184-187

A field and storage trials (at 8.5°C, from 9 to 20 days) were conducted on 45 new Capsicum cvs, and survey of consumer's attitude to capsicum quality, size, shape and colour and usage. Most consumers liked small to medium, flat round, crisp, blemish-free red capsicums. Only 40% of consumers surveyed indicated that capsicum available was good. About half were prepared to pay a higher price for better quality capsicums. Usage of capsicum was evenly divided between salads and cooking. SRA

Mustard

179

Cui (W), Eskin (NAM) and Biliaderis (CG). **Chemical and physical properties of yellow mustard (*Sinapis alba* L.) mucilage.** *Food Chemistry* 46(2); 1993; 169-176

The yield of crude mucilage (CM) from yellow mustard was 5% of total seed wt. CM was separated into 55.6% water-soluble fraction and 38.8% water-insoluble fraction. CM showed 80-94% carbohydrates, ash 1.7 - 15% and protein 2.2 - 4.4%. Also it showed 22.35% glucose, 11 - 15% galactose, 6.0 - 6.4% mannose, 1.6 - 4.0% rhamnose, 2.8 - 3.2% arabinose and 1.8 - 2.0% xylose. All mucilage fractions exhibited interfacial activity, shear thinning behaviour typical of xanthan gum dispersions and the water-soluble fraction was least affected by pH, temp. and solutes (NaCl, sucrose). SD

180

Niazi (AHK) and Shah (FH). **Mustard protein concentrate: A potential source for food stuffs.** *Bangaldesh Journal of Scientific and Industrial Research* 27(3/4); 1992; 102-113

Ten Pakistani traditional dishes Allu kabab (potato cutlets), Barian (spiced pulse balls), biscuits, dahi babrae (cultured milk gram cutlets), gram rice maroonda (gram snacks), laddu (sweet balls of roasted grams), missi roti (spiced Pakistani bread), Pakorae (fried gram flour balls), rice maroonda (rice snacks), Seikh kabab (meat roll) and shami kabab (meat gram cutlets) were incorporated with mustard protein concentrates (MPC). Protein contents of dishes increased from 6.41 to 97.73%. Sensory evaluation showed that MPC fortified dishes were readily acceptable. BV

Pepper

181

Piggott (JR) and Othman (Z). **Effect of irradiation on volatile oils of black pepper.** *Food Chemistry* 46(2); 1993; 115-119

Steam distilled volatile oils of black pepper from 3 sources, untreated and treated with 10, 20 and 30 kGy doses of gamma radiation were analysed by capillary GC at 1, 30 and 90 days storage at 24°C. There was no systematic change in volatile oil content with radiation dose or storage period, but principal component analysis of data showed clear difference between control and irradiated samples of 2 peppers immediately after treatment; and upon storage the differences reduced. There was no changes in the third sample due to radiation. SD

182

Minguez-Mosquera (MI), Jaren-Galan (M) and Garrido-Fernendez (J). **Lipoxygenase activity during pepper ripening and processing of paprika.** *Phytochemistry* 32(5); 1993; 1103-1108

The crude enzymatic extract obtained directly by tituration of the fruits of *Capsicum annuum* in phosphate buffer followed by filtration was shown to be suitable for the measurement of lipoxygenase activity. The use of Triton X-100 did not improve extraction and the use of DTT to protect the enzyme against oxidizers was not necessary. The optimum pH was 7 for the extraction and 6.5 for measurement of activity. The number of previous harvests from the plant had a marked effect on the levels of lipoxygenase activity during ripening of the fruits from two var. of pepper. During drying, there was a progressive loss of activity in both var. AA

183

Kowalski (E), Ludwig (H) and Tauscher (B). **Hydrostatic high pressure to sterilize food. I. Application to pepper (*Piper nigrum* L.).** *Deutsche Lebensmittel-Rundschau* 88(3); 1992; 74-76 (De)

Black pepper, at 40°C, was exposed to hydrostatic pressure up to 4000 bar. This led to a decrease by several orders of magnitude in the number of viable microorganisms on both natural pepper and pepper which had been contaminated by defined doses of *B. cereus* spores. Kinetic studies have shown that the course of inactivation can be described by a reaction order between 1, 5 and 2. A reduction of counts was achieved only in the presence of an aqueous medium, however, in dry pepper, the treatment failed. After exposure to pressure, there was a minor change in the relative proportions of the various volatile oils and in those compounds responsible for the pungent taste of the pepper. AA

184

El-Dessouki (S). **Aflatoxins in cayenne-pepper and paprika-powder.** *Deutsche Lebensmittel-Rundschau* 88(3); 1992; 78 (De)

Fifteen random samples of paprika powder and 24 random samples of Cayenne pepper powder were analysed for aflatoxins. Seven of the paprika samples contained aflatoxin B_1 and B_2 up to 15.3 μg/kg total aflatoxins. 13 of the Cayenne pepper samples contained aflatoxin B_1, B_2 and G_1 up to 218 μg/kg total aflatoxins. AA

Turmeric

185

Yasni (S), Imaizumi (K), Nakamura (M), Aimoto (J) and Sugano (M). **Effects of *Curcuma xanthorrhiza* Roxb. and curcuminoids on the level of serum and liver lipids, serum apolipoprotein A-I and lipogenic enzymes in rats.** . *Food and Chemical Toxicology* 31(3); 1993; 213-218

The effects of *C. xanthorrhiza* Roxb. (commonly known as temus lawak or Javanese turmeric in Indonesia) on serum and liver lipids, serum high density lipoprotein (HDL)-cholesterol and apolipoprotein A-I and liver lipogenic enzymes were studied. In rats fed a cholesterol-free diet, *C. xanthorrhiza* decreased the concn. of serum triglycerides, phospholipids and liver cholesterol and increased serum HDL-cholesterol and apo A-I. Rats fed high-cholesterol diet, *C. xanthorrhiza* did not supress the elevation of serum cholesterol, although it decreased liver cholesterol. Curcuminoids prepared from *C. xanthorrhiza* had no effect on the serum and liver lipids. GS

SENSORY EVALUATION

186

Bertino (M) and Lawless (HT). **Understanding mouthfeel attributes: A multidimensional scaling approach.** *Journal of Sensory Studies* 8(2); 1993; 101-114

Multidimensional scaling (MDS) was used to study qualitative relationships among mouthfeel attributes encountered in oral healthcare products. Similarity estimates were obtained from a rapid sorting task and from pairwise similarity ratings. Configurations were interpreted as suggesting four groupings of oral sensations: numbing, astringency, pain and taste. The pain-associated sensations were futher differentiated into thermally related sensations and chemically related sensations in some configurations. Two-dimensional solutions from the sorting task and from group-averaged similarity ratings were similar. Individual differences scaling solutions, however, showed unacceptably high stress in two dimensions, suggesting additional nuances in meaning to individual panelists that were not captured by group-averaged data or by sorting data. AA

187

Tuorila (H) and Vainio (L). **Percieved saltiness of table spreads by varying fat compositions.** *Journal of Sensory Studies* 8(2); 1993; 115-120

Four types of spread with 80% fat, but varying in the origin of the fat (milk/vegetable) and in the proportion of oil versus solid fat (0-90% vegetable oil), were manufactured at NaCl concn. of 1.0, 1.5 and 2.0%. Their saltiness and degree of melting in the mouth were rated using the time-intensity (TI) procedure. The perceived max. saltiness of each NaCl concn. varied widely, samples with 80% milk fat + 20% vegetable oil being the most salty and those with 15% vegetable fat + 85% vegetable oil the least salty. The differences in saltiness were not directly related to the degree of melting in the mouth. The results demonstrate that extrapolating saltiness on the basis of NaCl contents over brands of products would be risky, since saltiness and NaCl contents are not necessarily correlated even in apparently similar products. AA

188

Chambers (EIV) and Smith (EA). **Effect of testing experience of performance of trained sensory panelists.** *Journal of Sensory Studies* 8(2); 1993; 155-166

Inexperience and experienced panel with similar training evaluated a product class that the experienced panel had tested extensively and another product class unfamiliar to both the groups. Results indicate that intensive training is more important than experience for intra panel consistency. SD

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

189

Schwack (W) and Kopt (G). **Photodegradation of the carbamate insecticide pirimicarb.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(3); 1993; 264-268

In order to study the photoreactivity of pirimicarb (2-(dimethylamino)- 5, 6 - dimethyl-pyrimidi-4-yl-N-dimethylcarbamate) on plant surfaces, model experiments with organic solvents were performed. Pirimicarb decomposed readily when irradiated ($\lambda > 280$ nm) in the presence of the selected model solvents to form a number of products. Half-lives were in the order isopropanol < cyclohexane < cyclohexene (up to a max. of 140 min). In the presence of all 3 solvents photooxidation predominated leading to N-formylpirimicarb and, in the second step, to N-desmethylpirimicarb as well as to further oxygenated products with the carbamate moiety intact. Photolysis in cyclohexene resulted in photomineralisation as the main degradation pathway. Irradiation of pirimicarb in the presence of isopropanol also yielded an addition product of the parent compound with the secondary alcohol. AA

190

United Phosphorus Ltd. **Workshop on phosphine as a fumigant - a critical appraisal. June 24th - 25th 1993, Mysore.** 66; 1993

Abstracts of various papers presented at the proceedings such as Aluminium phosphide

fumigation of sorghum in Sudan by Krishnamurthy, K. (pp. 7-9); the fumigation of grains using Al phosphide by Deshmukh, P. B. and Gover, K. S. (pp. 9); Control of major pests of copra with phosphine fumigation by Nalina Kumari, T., Mammen, K. V. and Visalakshi, A. (pp. 10-11); role of phosphine in the protection of plantation products and processed foods by Narasimhan, K. S. and Jayaram, M. (pp. 11-12); the deciding factors for effective grain fumigation with phosphine under the existing storage conditions in India by Rajendran, S. (pp. 15-16); effect of aluminium phosphide on seed viability and insect infestation of paddy, sorghum and Bengal gram by Shekar Shetty, H., Narasimhan, K. S. and Raghunathan, A. N. (pp. 16-17); importance of gas proof sheet/cover in fumigation of agricultural commodities and processed foods with phosphine in milled grain products, spices and beverages by Rema Devi, K., Visalakshi, A and Naseema Beevi, S. (pp. 35-37); the interaction of phosphine with food constituents by Godavari Bai, S. (pp 46-47); status and prospects of safe mineral protectants in storage of grains by Venugopal, J. S. and Putte Gowda (pp. 50-51); Pesticide residues in food-beef for standard analytical techniques by Handa, S. K. (pp. 53-54) is discussed. CSA

BIOCHEMISTRY AND NUTRITION

191

Hirose (M). **Molten globule state of food proteins.** *Trends in Food Science and Technology* 4(2); 1993; 48-51

Reviews the molten globule state which is an intermediate state for food proteins between the native and denatured conformations; its role in the functional properties (gelation, emulsification and foaming) of foods. 29 references. GS

192

Filer (LJJr). **Special issue of a proceedings on a workshop on child and adolescent obesity: what, how and who ?.** *CRC Critical Reviews in Food Science and Nutrition* 33(4/5); 1993; 287-430

193

Thompson (LU). **Potential health benefits and problems associated with antinutrients in foods.** *Food Research International* 26(2); 1993; 131-149

Reviews the problems and benefits associated with the antinutrients such as phytic acid (PA), lectins, phenolic compounds (tannins), saponins, enzyme inhibitors (amylase and protease) and triglycerides. The health benefits highlighted are lowering of blood glucose and hormonal responses, reduction of blood lipids and reduction of cancer risks and other benefits. 352 references. GS

194

Kinsella (JE). **Advances in food and nutrition research.** 37,; 1993; 1-437

This volume covers on food, diet and gastrointestinal immune function by Pestka, J. J. (pp. 1-66); effect of consumption of lactic cultures on human health by Sanders, M. E. (pp. 67-130); defining the role of milk fat in balanced diets by Berner, L. A. (pp. 131-257); biochemistry of cardiolipin: sensitivity to dietary fatty acids by Berger, A., German, J. B. and Gershwin, M. E. (pp. 259-338); diseases and disorders of muscle by Pearson, A. M. and Young, B. (pp. 339-423). CSA

TOXICOLOGY

195

Azimahtal (HLP) and Tey (LY). **Enzyme-linked immunosorbent assay for aflatoxin B_1 in** cereals and peanuts. *ASEAN Food Journal* 7(4); 1992; 209-211

Two white New Zealand rabbits were injected with 100 µg conjugated aflatoxin B_1 (AFB_1). The initial criteria for the validation of an indirect competitive enzyme-linked immunosorbent assay (ELISA) for AFB_1, was the setting up of a sensitive standard curve using sufficiently high titre of anti-aflatoxin antibody and high specificity to the antigen aflatoxin. The titre of the two rabbits at their max. after 10 wk of priming injection showed a titre of > 50.00 after 6 wk of priming. The ELISA had a sensitivity of 0.015 µg/mL and working range of upto 20 μg/mL at specific dilution of antibody and conjugated IgC peroxidase. Peanuts, corn, wheat, barley, soy beans and peanut butter extracts prepared for un contaminated samples did not show significant inhibition in the ELISA. The av. recovery for corn spiked with 1 μg/mL AFB_1 was 80%, for peanuts 80%, for wheat 77%, for barley 75% and for peanut butter 80%. Almost identical results were obtained for samples spiked with 2 μg/mL AFB_1. SRA

196

Chinnaswamy (N), Harish Kumar (N), Uday Kumar (P) and Rukmini (C). **Toxicological studies on debitterized neem oil (*Azadirachta indica*).** *Food and Chemical Toxicology* 31(4); 1993; 297-301

Neem seed (NS) contains 45% oil and is a minor oil of considerable potential. A three-generation study carried out in 15 male and 15 female rats fed diet containing 10% NSO is reported. Mutagenicity test of NSO was found to be negative in Ames test and NSO devoid of all the bitter and odoriferous principles may be recommended as safe for consumption by humans. BV

197

Aulepp (H) and Vieths (St). **Problems of food allergies.** *Deutsche Lebensmittel-Rundschau* 88(6); 1992; 171-179 (De)

198

Mardsen (J) and Pesselman (R). **Nitrosamines in food-contact netting: Regulatory and analytical challenges.** *Food Technology* 47(3); 1993; 131-134

The history, chemistry and potential carcinogenic effects of nitrosamines has been documented in this article. The material and data included in this article intend to present an overview of the events leading to the filing of a food additive petition and an outline of the testing plan. The results conclusively show a reduction in the levels of nitrosamines detected in crude-meat products processed in elastic-rubber netting. CSA

FOOD LAWS AND REGULATIONS

199

Pruthi (JS). **International legislation of food irradiation - present scenario.** *Beverage and Food World* 20(2); 1993; 19-22

200

Sinha (KK). **Mycotoxins.** *ASEAN Food Journal* 8(3); 1993; 87-93

This review deals with the problem of mycotoxins and particularly aflatoxins in different parts of the world. Covers, important mycotoxins and mycotoxin producing fungi, natural occurrence of mycotoxins, factors affecting mycotoxin contamination, toxic effects of mycotoxins and control of mycotoxins. 83 references. SRA

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GENERAL

201

Peri (C). **A hazard analysis model for food processes.** *Food Science and Technology Today* 7(2); 1993; 67-71

Presents a general hazard analysis concept and a methodological scheme, for the application to food processes. The food process hazards (product safety, product quality, energy loss, material loss, time loss, explosions, fire hazards and environmental pollution) are listed. Causes for such hazards are identified and preventive measures are suggested. GS

FOOD PROCESSING

202

Lechowich (RV). **Food safety implications of high hydrostatic pressure as a food processing method.** *Food Technology* 47(6); 1993; 170, 172

Resistance of *Clostridium botulinum* spores to high-hydrostatic-pressure and the food safety considerations and their effects on package/seal integrity, pH changes, possible nutrient changes, enzyme inactivation and possible reactivation at lower temp. used in high-hydrostatic-pressure processes are studied in this artcle. CSA

FOOD PACKAGING

203

Exama (A), Arul (J), Lencki (RW), Lee (LZ) and Toupin (C). **Suitability of plastic films for modified atmosphere packaging of fruits and vegetables.** *Journal of Food Science* 58(6); 1993; 1365-1370

Suitability of plastic films in standard configuration to maintain modified atm. was evaluated for common fruits and vegetables. Most films did not result in optimal O_2 and CO_2 atm., especially when produce had high respiration. Produce with low and medium respiration could be matched with films considering O_2 permeability requirements alone. MA packaging systems designed to produce optimal oxygen at suitable temp. could have complications from transient temp. increases during storage and/or transportation. Respiration rates of fruits and vegetables increase more with temp. than do gas permeabilities of films. Higher than optimum temp. could cause anoxia and seriously damage produce. More permeable gas pathways and temp. compensation to equalize Q_{10} values are needed for MA packaging systems to function effectively. AA

204

Townshend (GK). **Packaging management.** *Packaging India* 26(2); 1993; 5,7

This article deals with the issues of free trade and environmental crunch. On the environmental issue (1) source reduction in terms of lightweighting and substitution and (2) waste management-legislation, recycling have been dealt with. RN

205

Swinton (H). **Common misconception about packaging waste management.** *Packaging India* 26(2); 1993; 29, 31

This is a report on results of the survey conducted by Recycle NSW into house hold garbage. Deals with promotion and benefits of recycling. RN

206

Ishitani (T). **Fresh fruits and vegetables: The present state and problem of freshness preservation from the viewpoint of packaging technology.** *Packaging Japan* 44(7); 1993; 30-37

The review deals with quality elements and freshness of produces. Basis on freshness preservation of fruits and vegetables and their problems, trend in development of technology on freshness preservation of products, development of plastic films for freshness preservation, problems about freshness preservation and its future trend and data necessary for freshness preservation.

packaging of fruits and vegetables. 10 references. RN

207
Sudhakar (G). **Bulk packaging of tea.** *Packaging India* 26(4); 1993; 14-16

Aspects described in this article are the disadvantages of conventional packing of tea, the design of bulk packaging system ideal for tea packing, its application in tea industries, the advantages of jumbo bags (Flexible Intermediate Bulk Containers FIBC)), the functions of jumbo bags and the results of filling FIBCs. CSA

208
Dasgupta (P). **Tea packaging - overview.** *Packaging India* 26(4); 1993; 17-18

The article presents an overview of the different forms of tea packging (bulk tea and packet tea), types of packages, functions of packaging (keep, protect and preserve), various packaging materials that are being used for packet tea, protection required for tea against moisture pick up, flavour loss, odour contamination, selection of packaging materials, possible damages on primary and secondary packaging materials and packaging machineries such as cartons, flexible pouches and soft pack. CSA

209
Varma (S). **Bag-in-box and lined cartons for tea packaging - a general appraisal.** *Packaging India* 26(4); 1993; 19, 21-23

Aspects covered are the evolution of bag-in-box package, the difference between lined cartons and bag-in-box, the basic cost of the cartons, manufacturers of lined cartons, filling and sealing, pack closures, mechanical handling of tea, packaging machinery for bag-in-box, weighers and lined cartons. CSA

210
Mukherjee (S). **Package in marketing.** *Packaging India* 26(4); 1993; 27-29

An analytical structure of the two dimensions of packaging such as functional objective (form/shape, convenience in usage, keeping quality, economy) and non-functional or subjective (appeal, image, culture, psychrography) is described. The physical and subjective factors affecting the primary (mini chests/jumbo bags and pet jars) and secondary packaging of tea is also covered in this article. CSA

211
Mitra (KK). **Alternative packaging for tea.** *Packaging India* 26(4); 1993; 31, 33-35, 37

Various alternatives for packaging of tea are corrugated cardboard boxes, multiwall paper sacks, rigid containers made of chip board and hard board, sacks of jute canvas with inner lining of plastic film. The present paper describes the basic design aspects of some of the alternative packaging systems which appear to have potentials for replacing the conventional plywood tea chests and also discusses the functional suitability of those systems. CSA

212
Cooper (BPW). **Bulk packaging of tea in flexible packaging for exports.** *Packaging India* 26(4); 1993; 39, 41-43, 45, 47

213
Narayanan (PV). **Quality assurance and eco-friendly packaging.** *Packaging India* 26(5); 1994; 5, 7-9

The major aspects dealt in this article are the quality assurance of packaged products, the coverage and objectives of ISO 9000, eco-friendly packaging and eco-regulations. CSA

214
Tiannan (X). **The recycling and remaking UBCs into packaging containers.** *Packaging India* 26(5); 1994; 23, 25,27, 29, 31, 33

Aspects dealt in this aricle are the consuming of two-peice cans, the recycling and remelting of used beverage cans (UBCs) in the United States, China and other countries, the legislation for the recycling of UBCs, the automatic recycling machinery of UBCs, the remarking and processing of UBCs into packaging containers, the proposals for developing a set of facilities for the remaking and reusing of UBCs, uses of packaging cans in packaging of paints, poster colours, coating, dyestuff, binder, seeds, washing powder, small hardware spares etc. CSA

FOOD ENGINEERING AND EQUIPMENT

215

Sakai (N) and Hayakawa (K-I). **Heat and moisture transfer in composite food - theoretical analysis of influence of surface conductance and component arrangement.** *Journal of Food Science* 58(6); 1993; 1335-1339

Heat and moisture transfer in composite bodies undergoing drying was simulated using a previously developed mathematical model which included the chemical potential of moisture as a mass transfer potential. Composite bodies included layered cylinders and concentric spheres consisting of a starch granule hydrate (H) and a hydrate of starch granules-sucrose 3:1 mixture (S). The influence of the following factors on heat and moisture transfer was examined: convective surface mass transfer conductance, initial moisture, and component arrangement. The 3 factors significantly influenced moisture transfer while they had slight influence on heat transfer. Overall drying rate of each composite body was influenced interactively by moisture fluxes, which were caused by a surrounding drying medium and by a mass transfer potential difference across the interface of H and S. AA

216

Wang (J) and Hayakawa (K-I). **Maximum slope method for evaluating thermal conductivity probe data.** *Journal of Food Science* 58(6); 1993; 1340-1345

The max. slope method (MAS) was verified theoretically and experimentally and compared with other data reduction methods: time correction factor method (TIC) and maximum r^2 method (MAR). Glycerol (99.5% pure) andagar gel (0.5%) were used as test materials. The max. errors of glycerol k-values determined from experimental data applying the MAS, TIC and MAR were 2, 0.7 and 3% respectively. Those of agar gel k-values determined by the same methods were 1, 1 and 0.8% respectively. An advantage of the MAS method is that it does not require probe calibration and there is no need for reference material suitable for each k-detn. of different test samples. GS

217

Park (HJ), Weller (CL), Vergano (PJ) and Testin (RF). **Permeability and mechanical properties of cellulose-based edible films.** *Journal of Food Science* 58(6); 1993; 1361-1364, 1370

Factors affecting barrier properties [oxygen permeability (OP) and water vapour permeability (WVP)] and mechanical properties [tensile strength (TS) and elongation (E)] were investigated for methyl cellulose (MC) and hydroxypropyl cellulose (HPC) films. OP, WVP and TS of MC and HPC films increased as the mol. wt. (MW) of the cellulose increased. E of MC films increased as MW increased, but E of HPC films was highest for the intermediate MW of 370,000. OP, WVP and TS of MC films were not a function of thickness, but E slowly increased as film thickness increased. OP and WVP of HPC films were not relatable to film thickness, but TS and E of HPC films slowly increased as film thickness increased. TS decreased and E increased for both film types as concn. of plasticizers was increased. Plasticizers enhanced or retarded OP and WVP of cellulose-based films, depending on their concn. AA

218

Padua (GW). **Microwave heating of agar gels containing sucrose.** *Journal of Food Science* 58(6); 1993; 1426-1428

A mathematical model was developed for predicting the temp. profiles of cylindrical samples of sucrose containing agar gels heated by microwaves. Temp. was modeled in terms of dielectric properties of gels and the power absorbed by the sample. Experimental corroboration of the predicted temp. was obtained by microwave heating cylindrical gels of 2% agar containing 0, 40 and 60% sucrose. The levels of sucrose in the gels notably affected the temp. profiles in the cylinders. Samples with no sucrose showed a pronounced central heating effect, 40% sucrose samples showed a early uniform heating profile and 60% sucrose samples showed surface heating. AA

219
Abbatemarco (C) and Ramaswamy (HS). **Heating behaviour and quality factor retention in a canned model food as influenced by thermal processing in a rotary retort.** *Journal of Food Quality* 16(4); 1993; 273-285

Heat penetration data was obtained on a canned model food (gelatinized starch) processed in a rotary retort under temp. 110-130°C; rotation speed 10-20 r.p.m., can headspace 6.4 - 12.8 mm and starch concn. 3.4%. Apparent viscosity and hunter L, a and b values were obtained before and after each run. The % of selected nutrients, colour retained at each processing condition was estimated. All factors except headspace were found to influence significantly the heating behaviour as higher temp. and rotation speeds retained quality factors better and reduced the process time. SD

220
Mertens (B) and Deplace (G). **Engineering aspects of high-pressure technology in the food industry.** *Food Technology* 47(6); 1993; 164-169

Knowledge of the requirements of high-pressure processes (cold isostatic pressing, warm isostatic pressing and hot isostatic pressing) that can lead to the development of foods with high nutritional and sensory quality and other desirable properties in dealt in this article. The crucial requirements for the commercial application of high-pressure technology in the food industries such as capacity of the high pressure vessels, cycling time, process control, safety, sanitation, cleaning and disinfection, package design, investment cost and identification of feasible applications are also discussed. CSA

221
Knorr (D). **Effects of high-hydrostatic-pressure processes on food safety and quality.** *Food Technology* 47(6); 1993; 156, 158-161

This article briefly reviews some of the high-pressure-related research activities on food safety issues, quality and functionality aspects and process development opportunities such as UHP blanching and secondary metabolite release. 36 references. CSA

222
Maesmans (G), Hendrikx (M), De Cordt (S) and Tobback (P). **Theoretical considerations on design of multicomponent time temperature integrators in evaluation of thermal process.** *Journal of Food Processing Preservation* 17(5); 1993; 369-389

The use of time temp. integrators (TTIs) as an alternative means of process evaluation, besides *in situ* process monitoring and the physical mathematical method has received lot of attention. Multicomponent TTIs have been suggested to evaluate the integrated impact of time and temp. on a target quality attribute. The question how from the combined reading of these individual systems, the impact of the heating process on a target quality parameter can be predicted has not yet been answered. In this theoretical study, the restriction of two interpolation methods are critically considered in determining the impact on a target quality attribute from the reading of three other temp. sensitive systems. Possibilities of the 'equivalent point method' and a polynomial expression as interpolation method are tested. Since only limited information is available on the product temp. history in processing conditions when TTIs are used in applying these interpolations. A single-component TTI with an activation energy (0 - Z value) identical to the target quality attribute activation energy (Z value) may be preferable to estimate the impact of the thermal treatment. RN

223
Harkonen (H), Koskinen (M), Linko (P), Siika-aho (M) and Poutanen (K). **Granulation of enzyme powders in a fluidized bed spray granulator.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 235-241

n order to improve the handling properties of a fine enzyme powder the increasing of particle size by granulation was studied. Enzyme powders were granulated in a fluid bed granulator. Sodium chloride powder was used as a filler material, but in some cases no filler was used. In the first part of the study the granulation properties of the fine NaCl powder were studied. The particle size of the salt granules obtained was increased by 3 process parameters: increasing the concn. of the binder in the spraying sol., increasing the spraying rate of the binder sol. and lowering the temp. of the fluidizing air. When an enzyme powder was granulated it was observed that the largest granules were obtained when the filler material was mixed with the dry powder. The mean particle size in these types of granulated powders ranged from 135 to 200 µm. When the filler was added to the enzyme concentrate prior to drying the increase in particle size during the granulation process was negligible and the mean particle size was only slightly greater than 60 µm. The flowing properties of the enzyme granules were more easily improved than their wettability. The decrease in bulk density as a consequence of granulation was between 20 and 40%. AA

Equipments

224

Giese (J). **On-line sensors for food processing.** *Food Technology* 47(5); 1993; 88, 90-95

This article presents an overview of some of the instruments and sensors (ion-selective electrodes, field effect transistors and metal oxide gas) for on-line compositional monitoring of food quality factors. A report on the development and principles of operation for (1) biological and chemical sensors; (2) near-infrared reflectance and transmission analyzers for moisture and compositional measurement; (3) process refractometers for measurement of solids content; and (4) microwave and radio frequency measurement of food moisture is also presented. CSA

225

Zimmerman (F) and Bergman (C). **Isostatic high-pressure equipment for food preservation.** *Food Technology* 47(6); 1993; 162-163

Discusses the engineering design of isostatic high-pressure equipment for safe, durable and reliable operation for food preservation. Emphasis is placed on prestressed wire-wound pressure vessels. CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

226

Wolters (MGE), Diepenmaat (HB), Hermus (RJJ) and Voragen (AGJ). **Relation between *in vitro* availability of minerals and food composition: A mathematical model.** *Journal of Food Science* 58(6); 1993; 1349-1355

A mathematical model was developed to describe the relative influence of phytic acid, dietary fiber components, oxalic acid, citric acid and ascorbic acid on *in vitro* availability of Ca, Mg, Fe, Cu and Zn. The model was based on a combination of interdependent Langmuir isotherms. Throughout a diverse set of food products (cereal products, fruits, vegetables and nuts), the mathematical model described and predicted *in vitro* availability of Ca, Mg, Fe and Zn well (r = 0.89, 0.87, 0.90 and 0.92 respectively). The model proved valuable in studying simultaneous effects of food components on *in vitro* availability of minerals and trace elements in foods. Therefore, the mathematical model should help relate *in vitro* simulations to *in vivo* experiments. AA

227

Buera (MDP) and Karel (M). **Application of the WLF equation to describe the combined effect of moisture and temperature on non-enzymatic browning rates in food**

systems. *Journal of Food Processing Preservation* 17(1); 1993; 31-45

Nonenzymatic browning rates of several vegetables, dairy products and model food systems stored at different moisture contents and temp. were analysed and related to their glass transition temp. (T_g). The data analysed corresponded to a region of moisture content in which effects due to reactant diffusion could be expected. As changes in diffusion constants may in turn, be related to glass transition, the Williams-Landel-Ferry (1955) (WLF) equation was to describe the combined effects of moisture and temp. on the nonenzymatic browning rate constants. Ferry's (1980) procedure of reduced variables utilizing a reference temp. (T_0) was applied, the T_0 selected within the experimental range. In this procedure, the equation coffecients are calculated for the equation using T_0. Then they are recalculated by shifting the selected reference temp. to T_g to obtain the coefficients with reference to T_g. The resulting equation can be applied to relate the browning rate constants to temp., moisture and T_g. The equation has predictive value and the method avoids extrapolations when data at T_g are not available. AA

228

Walstra (P) and de Roos (Al). **Proteins at air-water and oil-water interfaces: Static and dynamic aspects.** *Food Reviews International* 9(4); 1993; 503-525

Proteins are very surface-active substances, and they readily adsorb onto o/w interfaces even in very low concn. Various interfacial properties resulting from their adsorption are briefly reviewed in relation to formation and stability of emulsions and foams. Displacement from the interface by small-molecule surfactants is discussed. It concludes that most effects of adsorbed proteins on the various kinds of physical instability of emulsions and foams are semiquantitatively understood, but variation among proteins in the production of small droplets and bubbles during emulsification and foaming, respectively still difies explanation. 42 references. SRA

229

Belton (PS). **New methods for monitoring changes in proteins.** *Food Reviews International* 9(4); 1993; 551-573

The techniques discussed in this review is nuclear magentic resonance, (protein structures in sol., relaxation time measurements, high-resolution solid-state NMR, infrared and Raman methods, probe microscopy). 50 references. SRA

230

Balny (C) and Masson (P). **Effect of high pressure on proteins.** *Food Reviews International* 9(4); 1993; 611-628

This paper reviews some basic knowledge on the effects of high pressure on proteins. Aspects covered include, general thermodynamic considerations on the effects of pressure on protein, origins and consequences of pressure effects on proteins (pressure effects on elementary interactions, pressure effects on the structure of proteins, stability zones, effects of pressure on protein functions, protein biosynthesis, sol-gel transitions), methods for studying proteins under pressure. (spectroscopic methods, electrophoresis, rapid mixing methods and diamond anvil cell). 78 references. SRA

Chemistry(Analytical)

231

Reisterer (KM), Zottola (EA) and Rulcher (RG). **Mapping protein foulants on polysulfone membranes using microspectrophotometry.** *Food Technology* 47(5); 1993; 104-108

The use of microspectrophotometry to analyze the distribution and concn. of protein, the major foulants encountered in the fouling of polysulfone membranes used in ultrafiltration concn. of milk is discussed in this article. The study demonstrates the direct correlation of higher absorbance in areas where foulants were present in greater concn. CSA

232

Kretzschmar (H-J) and Neyen (V). **Analysis of N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylen diamine (6PPD) in aqueous migrates of**

rubber articles in contact with food. *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 387-390 (De)

The present paper describes a new HPLC-method for detn. of N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylene diamine (6PPD). Because of low concn. in aqueous migrates a selective enrichment by using of solid phase extraction (SPE) is indispensable. 6PPD is separated completely from other coeluents in a relative short time by gradient elution with acetonitrile/phosphate buffer and is determined quantitatively by using an external standard. AA

233

Montanari (I), Fantozzi (P) and Pedone (S). **Tobacco fraction 1 protein (F_1P) utilization for oral or enteral feeding of patients. 1. Heavy metal evaluation.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 259-263

Tobacco leaf proteins are currently being studied for their possible use in human nutrition and in therapeutics. In the latter, it is compulsory to test the presence and levels of contaminants. This paper evaluates the presence of the principal heavy metals in the Tobacco Fraction 1 Protein (ribulose-1,5-diphosphate carboxylase) and compares the amounts with the provisional max. tolerable daily intake [(P)MTDI] and the provisional tolerable weekly intake (PTWI) in diets for comatose and nephrotic patients. AA

234

Wu (SY) and Brewer (MS). **Screening antioxidative and prooxidative activity in a solid medium model system.** *Journal of Food Biochemistry* 17(1); 1993; 1-13

The antioxidant screening method (based on solid medium composed of linoleic acid, Triton X-100 and thioharbituric and solidified with agar in a petriplate) allows single sample preparation and rapid detn. of antioxidant or prooxidant activity. Lipid peroxidation can be observed colorimetrically and potential antioxidants can be selected using these techniques. GS

235

Ramalakshmi (K), Prabhakara Rao (PG) and Abraham (KO). **Chemical analysis of chicory samples.** *Indian Coffee* 43(3); 1994; 22-24

Bureau of Indian Standards in collaboration with Coffee Board and CFTRI screened the various commercial samples of chicory (*Cichorium intibus*) powder to update the data on chemical composition and for needful changes in the specification. All the samples confirmed to ISI specifications in respect of total ash (3.5 - 8.0%), acid insoluble ash (max. 1.5%) and water soluble matter (60% min.). The moisture content of 2 samples marginally exceeded the prescribed limit of 10%. SRA

FOOD MICROBIOLOGY AND HYGIENE

236

Castro (AJ), Barbosa-Canovas (GVB) and Swanson (BG). **Microbial inactivation of foods by pulsed electric fields.** *Journal of Food Processing Preservation* 17(1); 1993; 47-73

Pulses of high voltage electric fields (PEF) are potentially a most important cold pasteurization/sterilization food preservation technique to replace on partially substitute for thermal process. During PEF process, lysis of microorganisms is caused by irreversible structural changes in the membranes, leading to pore formation and destruction of the semipermeable barrier of the membrane. Theories explaining electroporation of the cell membrane and application of non thermal PEF process are reviewed in this paper. 59 references. RN

237

Hoover (DG). **Pressure effects on biological systems.** *Food Technology* 47(6); 1993; 150-155

Aspects reviewed in this article are: history of hydrostatic processing, effect of biospheric pressures on microorganisms, effect of hydrostatic pressure on microorganisms, effects on enzymes and other proteins. 30 references. CSA

Enzymes

238

Jaffar (mB) and Oommen (S). **Production. preservation and characterization of pectin methylesterase (PME) from *Arthrobotrys oligospora*.** *Journal of Food Biochemistry* 17(1); 1993; 53-65

The production, purification and characterization of pectin methyl esterase (PME) from a nematophagous fungus, *Arthrobotrys oligospora* was studied. PME was stable between pH values of 5-8. Its optimum activity was at pH 7.5 and at 37°C. The energy of activation (E_a) was determined to be 11.9 kcal/mole. It had k_m of 0.9 mg/ml for pectin. The PME had a mol. wt. of 50 kg daltons. GS

Microorganisms

Bacteria

239

Grant (KA) and Kroll (RG). **Molecular biology techniques for the rapid detection and characterisation of foodborne bacteria.** *Food Science and Technology Today* 7(2); 1993; 80-88

Molecular techniques discussed breifly include: conventional methods, alternative rapid methods, molecular methods (DNA/RNA probe methods) hybridisation methods (detection methods, molecular finger printing methods), molecular technique in use, amplification methods - the polymerase chain reaction and other amplification techniques and application to food samples. BV

240

Ishibashi (N) and Shimamura (S). **Bifidobacteria: Research and development in Japan.** *Food Technology* 47(6); 1993; 126, 129-130, 132, 134

Bifidobacteria research in Japan shows that majority of the proposed physiological effects of bifidobacteria pertain to improvement of intestinal flora by preventing colonization of pathogens, amelioration of diarrhea or constipation and immunity activation. Other effects include vitamin production and antitumor activity. Administration of bifidobacteria through various bifidus products such as yoghurt, fermented milk, lactic-acid bacteria beverages, fresh milk products, powdered milk products, confectionery and health foods that are on market in Japan is discussed in this article. CSA

241

Nerbrink (E) and Borch (E). **Evaluation of bacterial contamination at separate processing stages in emulsion sausage production.** *International Journal of Food Microbiology* 20(1); 1993; 37-44

242

Peterz (M) and Steneryd (AC). **Comparative evaluation of two methods of enumerating enterococci in foods: Collaborative study.** *International Journal of Food Microbiology* 18(3); 1993; 211-221

Slanetz and Bartley's (SB) method were applied for comparison on 13 lab. tested 4 blind duplicate food samples containing different levels of enterococci and 2 negative control samples. Freeze-dried mixtures of bacteria were used as simulated food samples (reconstituted and either spread directly on the surface of (SB) medium and incubated at 44°C for 48 h or preincubated in tryptone soya agar at 37°C for 2 h before overlaid by SB and incubated at 37°C for further 46 h). The numbers CFU of enterococci recovered by the 2 methods were not significantly different except for one sample where the 37°C method gave higher recovery. The 44°C method was less time consuming and less laborious. SRA

Staphylococcus aureus

243

Valik (L) and Gorner (F). **Growth of *Staphylococcus aureus* in pasta in relation to its water activity.** *International Journal of Food Microbiology* 20(1); 1993; 45-48

Yersinia enterocolitica

244

Hudson (JA). **Construction and comparison of response surface kinetic model for the *Yersinia enterocolitica* type strain and a food isolate under aerobic conditions.** *International Journal of Food Microbiology* 18(3); 1993; 201-209

Response surface models were constructed for the type strain of *Yersinia enterocolitica* (ATCC 9610) and a wild type strain isolated from sliced roast lamb, for various conditions of temp., pH, sodium chloride concn. and sodium nitrite concn. Both strains grew at similar rates except at the 'extremes' of the conditions tested. Models for both quadratic and cubic polynomial equations are shown. The results obtained indicate that the cubic model is superior. AA

Fungi

245

Schmitz (S), Weidenbomer (M) and Kunz (B). **Heavy metals as selective inhibitors of mould growth.** *International Journal of Food Microbiology* 18(3); 1993; 233-236

Ten heavy metals were tested in malt extract agar for their inhibitory activity on 9 food relevant fungi *Trichoderma harzianum*, *Alternaria alternata*, *Fusarium oxysporum*, *F. culmorum*, *Mucor circinelloides*, *Rhizopus stolonifer*, *Cladosporium cladosporoides*, *Aspergillus versicolor*, *Penicillium citrinum*. $CoSO_4$ (0.1%) and $NiCl_2$ (0.1%) were found to inhibit *F. oxysporum* and *P. citrinum* 1% concn. of $CoSO_4$ and $C_4H_6O_4Pb$ inhibited the growth of all the fungi tested. $MnSO_4$ inhibited slow growing fungi like *C. cladosporoides* and *A. versicolor*. Rapidly growing fungi viz. *M. circinelloides* and *R. stolonifer* were supressed by all compounds. $NiCl_2$ was found to be suitable for growing selectively *P. citrinum*. The variations observed as growth inhibitory for heavy metals investigated indicated good possibility for designing selective media. BV

Agaricus bisporus

246

Mau (J-L), Beelman (RB) and Ziegler (GR). **Preparation, purification and identification of 10-oxo-trans-8-decenoic acid from the cultivated mushroom *Agaricus bisporus*.** *Journal of Food Biochemistry* 16(6); 1993; 371-388

10-Oxo-trans-8-decenoic acid (ODA) was produced by homogenizing mushrooms (*A. bisporus*) in phosphate buffer with added linoleic acid, extracted from the supernatant after centrifugation and purified using column and thin-layer chromatography. Using UV, infrared and MS and NMR spectroscopy, the purified compound (97.5% ODA) was characterized as a white, waxy solid with a pK_a of 4.68. GS

Aspergillus parasiticus

247

Luchese (RH) and Harrigan (WF). **Influence of pH and lactic acid on the levels of glucose needed to induce aflatoxin production in *Aspergillus parasiticus*.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 242-250

Aflatoxin production has been conditioned to the presence of a readily metabolizable sugar source. To evaluate the influence of pH and acid on the levels of glucose needed to induce aflatoxin production, a transfer technique of pre-grown mycelia coupled with the use of a protein synthesis inhibitor was employed. The results indicate that the major role of pH is related to the initial events of the synthesis. Hydrochloric acid and lactic acid had little effect. Aflatoxin yields between cultures of the same initial pH were directly correlated with the glucose content to which the mycelia were exposed during preincubation period. Nevertheless, glucose was not a limiting factor for aflatoxin synthesis to occur. The requirement for glucose was also dependent on the composition of the media employed. Apparently, the non-requirement of glucose in Lab-Lemco Tryptone Broth was related to factors existing in the yeast extract component. The findings suggests that more than one mechanism might be involved in the induction of aflatoxin synthesis. AA

Trichoderma viride

248

Gervais (P), Marechal (PA) and Voirin (). **Medium hydration effects on the growth of *Trichoderma viride*.** *Journal of Food Science* 58(6); 1993; 1346-1348

The hydration of gelled substrates was examined in relation to growth of the filamentous fungus *Trichoderma viride*. An experimental plan was designed to discriminate between the effects of thermodynamic (a_W) and kinetic parameters (water content) on fungal growth. At a set thermodynamic level of water (a_W), the decrease in water content caused by adding silica gel to the medium proved limiting to fungal growth. This limitation was attributed to diffusion as shown by experimental detn. of rotational and translational diffusivities of glucose in such media. AA

Yeasts

Candida cacaoi

249

Drider (D), Chemardin (P), Arnaud (A) and Galzy (P). **Isolation and characterization of the exocellular β-glucosidase of *Candida cacaoi*: Possible use in carbohydrates degradation.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 198-204

The present paper reports the study and purification of the exocellular β-glucosidase of *Candida cacaoi*. This enzyme was purified by ion exchange chromatography and by gel filtration. Its mol. wt. was estimated at 440 kDa. The oligomeric structure was determined following treatment of the purified enzyme with dodecyl sulphate (SDS). The structure is composed of 4 identical subunits of 110 plus or minus 10 kDa. Its optimal temp. is 55°C, and the optimum pH is 4. The enzyme is active against all the glucosides with the following configuration: β(1-2), β(1-3), β(1-4), β(1-6), α-(1-4) and α(1-6). These results could justify the utilization of the enzyme in the liberation of terpenols from terpenyl glucosides. This enzyme is constitutive and repressed by glucose. AA

Rhodotorula rubra

250

Oxen (P) and Knorr (D). **Baroprotective effects of high solute concentrations against inactivation of *Rhodotorula rubra*.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 220-223

High hydrostatic pressure (200 to 400 MPa) treatment of *Rhodotorula rubra* suspended in sol. of sucrose, glucose, fructose or NaCl resulted in a_W dependent barotolerance. The protective effect started at values below a_W = 0.92 to 0.88. Increase in time of treatment over 15 min had a small influence. In sucrose, the effect was independent of pH between pH 3.0 and 8.0. Inactivation of the yeast at low a_W could be achieved by pressure treatment at increased temp. (45°C). At atmospheric pressure, processing temp. of 70 to 80°C were required to accomplish the same effects. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

251

Smith (RL) and Ford (RA). **GRAS substances: Recent progress in the consideration of flavouring ingredients under the Food Additives Amendment.** *Food Technology* 47(6); 1993; 104, 106, 108, 112, 114, 116, 117

A list of 22 new flavouring ingredient substances determined to be generally recognized as safe (GRAS) by the expert panel of the Flavour and Extract Manfacturers' Association is presented in this article. CSA

Sweeteners

252

Verdi (RJ) and Hood (LL). **Advantages of alternative sweetener blends.** *Food Technology* 47(6); 1993; 94, 96, 98, 100, 101

The advantages that can be expected when formulating foods and beverages with sweetener blends such as aspartame, acesulfame K, saccharin, alitame and sucralose which provides better taste, stability and economics than single sweeteners is discussed. CSA

CEREALS

253

Nuebel (C) and Peleg (M). **Compressive stress-strain relationships of two puffed cereals in bulk.** *Journal of Food Science* 58(6); 1993; 1356-1360, 1374

The compressive stress-strain relationships of two puffed cereals, rice and corn based, in bulk were determined using a Universal Testing Machine. The general sigmoid shape of the relationship could be described by a 4 parameter empirical model originally developed for cellular solids. Jaggedness could be expressed in terms of an apparent fractal dimension and/or the mean magnitude of the power spectrum determined using the Fast Fourier Transform. Both measures as well as a particular parameter of the empirical model were sensitive indicators of the changes in the stress-strain relationships resulting from exposure to different relative humidities. Although the stress strain relationship, especially of dry samples, had an irregular, irreproducible shape, the magnitude of the two roughness measures was highly reproducible. AA

254

Richter (KS), Dorneanu (E), Eskridge (KM) and Rao (CS). **Microbiological quality of flours.** *Cereal Foods World* 38(5); 1993; 367-369

Over 4,000 wheat flour samples were tested according to FDA/BAM methods for *Salmonella* and *Escherichia coli* in addition to yeast and mold, aerobic plate count (APC), and coliform most probable number (MPN) counts. The data were analyzed statistically based on flour type - hard red winter (HRW), soft red winter (SRW), spring (SPG), or durum (DUR) - and season of milling production. SRW had the highest mold count ($\log_{10}$ 3.06 cfu/g) and DUR the lowest ($\log_{10}$ 2.85 cfu/g). SPG had the highest yeast count ($\log_{10}$ 2.27 cfu/g) and SRW the lowest ($\log_{10}$ 2.07 cfu/g). Highest APCs were found in DUR ($\log_{10}$ 4.24 cfu/g), whereas the lowest were in SRW ($\log_{10}$ 3.83 cfu/g). Of the samples tested, 12.8% were *E. coli* positive and 1.3% were *Salmonella* positive with the highest frequency of each pathogen occurring in the fall and winter months, respectively. The lowest *E. coli* frequency occurred during spring, whereas *Salmonella* had the lowest incidence in summer. The highest % of *E. coli* positives was observed in DUR (17%) and the lowest was observed in HRW samples (6.7%). The highest % of *Salmonella* positives existed in SRW (2.3%) and the lowest in DUR flour samples (0.3%). From the data, 95% confidence limits of 5,700 cfu/g for mold, 110,000 cfu/g for APC, and 150 MPN/g for coliforms were determined for all wheat flours. AA

255

Madhyastha (S), Marquardt (RR) and Abramson (D). **Effect of ochratoxin producing fungi on the chemical composition of wheat and barley.** *Journal of Food Quality* 16(4); 1993; 287-299

Autoclaved barley and wheat were inoculated with *Aspergillus alutaceus* (formerly called *A. ochraceus* Wilhelm NRRL-3174) and *Penicillium verrcosum* Dierckx and incubated at 28°C for 7, 15 and 30 days. Ochratoxin production of *P. verrucosum* on both barley (56 μg/g) and wheat (109 μg/g) increased significantly after 30 days of incubation. Ochratoxin production was significantly higher for *A. alutaceus* on wheat (79 μg/g) compared to barley (38 μg/g). Wheat supported the growth of both fungi significantly better than barley. There were marked decrease in the lipids in wheat and barley; modest decrease in their starch content; enhanced concn. of protein in wheat with both the fungal species; and a change in the relative concn. of some of the amino acids in wheat. These indicate that under certain conditions large amounts of Ochratoxin can be produced in grains with correspondingly small effects on starch and protein contents. SD

Barleys

256

Bason (ML), Ronalds (JA) and Wrigley (CW). **Prediction of safe storage life for sound and weather-damaged malting barley.** *Cereal Foods World* 38(5); 1993; 361-363

Measures of damage index employed in this study include falling number, stirring number, Ceralpha α-amylase and a newly derived hot water immersion test. All of these were well correlated with grain storage life for 7 cvs of malting barley stored at 3 different temp. (30, 47 and 60°C). Consequently they have been fitted to the storage life model which is available as a software package (SAFESTOR) for use by the industry. It permits prediction of acceptable storage life, and thus provides a tool for the better management of barley storage. CSA

Oat

257

Liukkonen (K), Kaukovirta-Norja and Laakso (S). **Elimination of lipid hydrolysis in aqueous suspensions of oat flour.** *Journal of Cereal Science* 17(3); 1993; 255-265

Aqueous suspensions of oat flour were studied to investigate the possibilities of eliminating the development of rancidity due to lipid hydrolysis. The hydrolysis was efficiently eliminated by immersing dry-milled flour in slightly alkaline water. Only a slight increase in pH was needed (pH 8-9) at the beginning of the soaking to prevent almost completely the hydrolysis of triglycerides, which under similar conditions, but in water without pH adjustment, led to free fatty acid content of upto 36% of the total lipids. In the alkaline suspensions the selective loss of linoleic acid from polar lipids, observed in a water slurry, was also very efficiently reduced. The hydrolysis of triglycerides was also diminished at acidic pH values (below pH 6) increasingly with reducing pH, although the same efficiency of inhibition as at alkaline pH was not reached. It was concluded that wet processes can be used for the preparation of non-deteriorated oat products by including simple pH adjustments in the process. AA

258

Ekstrand (B), Gangby (I), Akesson (G), Stollman (U), Lingnert (H), Dahl (S). **Lipase activity and development of rancidity in oats and oat products related to heat treatment during processing.** *Journal of Cereal Science* 17(3); 1993; 247-254

A pilot plant process simulation of dry and wet hydrothermic treatment of oats was performed in order to study the effect of the different process steps on lipase activity and the storage stability of the fat phase. A comparison was made between oats that had passed through a dry kiln treatment prior to steam preparation and oats that had only been steam-treated. Samples were taken after each step in the process as well as during storage at +30°C for up to 44 wks. The lipase activity disappeared after steam preparation, but not after the dry-heat treatment used in this process experiment. The fat phase was analysed with regard to the amount of free fatty acids (FFA) and the content of individual fatty acids. The initial content of FFA was about 8-9%. The hydrolysis of fat, giving an increase in the amount of FFA, took place in all the stored samples, but was much more pronounced in the samples that had not undergone dry- heat treatment. In the dry-heat-treated samples, the FFA concn. reached a max. at 13-15% after 16 wks of storage. In the samples that had not been dry-heat-treated, the FFA reached over 30% in whole oat grains after 16 wks of storage and continued to increase to over 40% after 30 wks of storage. In the flour the FFA concn. was lower than in whole grains. Unexpectedly, lipolysis in this case was more pronounced in the whole kernels than in the flour samples. Lipolysis was not related to the measured remaining lipase activity. Head-space analyses of hexenal indicated that the formation of volatile lipid oxidation products was dependent on the process design, but the hexanal concn. was not related to the amount of FFA. AA

Rice

259

Morita (T) and Kiriyama (S). **Mass production method for rice protein isolate and nutritional evaluation.** *Journal of Food Science* 58(6); 1993; 1393-1396, 1406

A method for mass production of highly purified rice protein isolate (RPI) was developed and its chemical composition was analyzed. The nutritional quality of RPI and its effect on lipid metabolism in rat was also examined. Rice flour was mixed with a 0.6% Termamyl 120L-sol. (1:2, w/v) at room temp. (= 23°C), to obtain thick slurry. The slurry was heated at 97°C for 2 h with stirring. Gelatinization and liquefaction occurred simultaneously RPI obtained by filtration and washing with boiling water was more than 90% pure protein (dry matter basis), had 6.4% dietary fiber, 1.3% ash and 1.1% carbohydrate. RPI diets (40-50%) allowed the max. growth in rats comparable to that with 25% casein diet. GS

260

Lin (SH). **Water uptake and gelatinization of white rice.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 276-278

A mathematical model is employed to describe the water diffusion and gelatinization of white rice. Experiments are performed to measure change of water content of rice during soaking. The observed data are used to estimate the effective diffusion and reaction rate coefficients. Both temp.-dependent coefficients are shown to obey the Arrhenius equation with a distinct break point where rapid gelatinization of rice begins. The enhanced gelatinization process is seen to cause a considerable increase in the activation energies. AA

261

Lima (I) and Singh (RP). **Objective measurement of retrogradation in cooked rice during storage.** *Journal of Food Quality* 16(5); 1993; 321-337

An Instron Universal testing machine and Differential Scanning Calorimetry were used to investigate textural changes in cooked rice during storage. Two cells were used with the Instron for hardness measurement (Ottawa Texture Measuring System and Back Extrusion cells) and one cell for adhesion measurement (adhesion cell). During storage of cooked rice, retrogradation of the starch led to an increase in hardness as well as a decrease in the adhesion of cooked rice. Storage time, temp. and var. significantly influenced the hardness and adhesion of cooked rice. A correlation analysis between methods showed that Instron measurements OTMS and BE correlated better with a correlation coefficient of 0.978 than the two Instron methods and DSC with a correlation coefficient of 0.752. AA

262

Satyanarayana (A), Giridhar (N), Venkateswara Rao (M) and Krishna Murthy (GV). **Physical, chemical and milling characters of rice varieties.** *Andhra Agricultural Journal* 38(2/3); 1991; 133-138

25 rice var. for physical and milling characteristics and of them 15 var. for their chemical composition of rice grain and bran were studied. The highest yield of brown rice was in Rajendra (80.4%) and the highest yield of head rice in Vasishta (70.2%). The total amylose content was higher in Dhanyalaxmi and IR 50 (28.63%). The water insoluble amylose content of the starch showed an inverse relation with the gelatinization temp. The highest bran content was in Dhanyalaxmi (8.3%) and the bran oil content in NLR 13969 (25.0%). The var. indicated marked variability for the quality characters. AA

Wheat

263

Shashikumar (K), Hazelton (JL), Ryu (GH) and Walker (CE). **Predicting wheat sprout damage by near-infrared reflectance analysis.** *Cereal Foods World* 38(5); 1993; 364-366

Naturally weathered and lab.-sprouted wheat samples were used to study the correlations of near-infrared reflectance (NIR) spectra with Rapid Visco-Analyser (RVA) and falling number results. Correlations of r = 0.95 and above were observed between values obtained by RVA and falling number methods. NIR predictions of sprout damage as measured by both falling number and RVA were fair to good (r = 0.75 - 0.87). NIR analysis of sprout-damaged wheat meal offers a rapid screening test that would need to be confirmed by RVA or falling number methods in the case of questionable samples. AA

264

Sabbarwal (DB). **Viability of export of wheat.** *Indian Miller* 24(2); 1993; 57-59

Wheat production world wide, domestic, level of consumption, export potential of wheat and wheat flour are discussed. SRA

265

Sorvaniemi (J), Kinnunen (A), Tsados (A) and Malkki (Y). **Using partial least squares regression and multiplicative scatter correction for FT-NIR data evaluation of wheat flours.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 251-258

Scanning Fourier transform near infrared reflectance (FT-NIR) spectroscopy was used to record spectra of roller and commercial milled wheat flours (var. and mixtures). Partial least squares (PLS) regression of multiplicative scatter corrected (MSC) NIR data was carried out. Correlations to moisture, protein, wet gluten, water absorption and falling number were studied. Promising correlations to these parameters except falling number were obtained for both types of milled samples. Explanation factors (R^2) and standard errors of prediction (SEP) in the roller milled flours were as follows: moisture R^2 = 0.97 and SEP = 0.16 g/100 g; protein R^2 = 0.92 and SEP = 0.40 g/100 g d.b. (dry basis); wet glutein R^2 = 0.89 and SEP = 1.37 g/100 g; and water absorption R^2 = 0.83 and SEP = 0.84 g/100 g. The explanation factor of predicted falling numbers to the actual values of the roller milled flours remained lower than 0.5. Explanation factors and SEP in the commercial milled flours were as follows: moisture R^2 = 0.85 and SEP = 0.19 g/100 g; protein R^2 = 0.91 and SEP = 0.63 g/100 g d.b.; wet gluten R^2 = 0.87 and SEP = 2.22 g/100 g; water absorption R^2 = 0.88 and SEP = 1.10 g/100 g; and falling number R^2 = 0.55 and SEP = 28.2. AA

MILLETS

266

Sievert (D) and Wursch (P). **Amylose chain association based on differential scanning calorimetry.** *Journal of Food Science* 58(6); 1993; 1332-1334, 1345

Amylose and lipid depleted starches from amylomaize, pea, maize, wheat, potato and waxy maize were heated from 20°C to 180°C, cooled to 4°C, and then reheated to 180°C in a differential scanning calorimeter (DSC) in excess water. Cooling curves of the amylose and starch melts showed exothermic transitions (< 70°C) attributed to the mechanism of amylose chain association. Amylose/amylopectin mixtures covering the range 0-95% amylose were similarly heated and cooled. The association of linear amylose chains was restricted by amylopectin. AA

Corn

267

Hounhouigan (DJ), Nout (MJR), Nago (CM), Houben (JH) and Rombouts (FM). **Changes in the physico-chemical properties of maize during natural fermentation of mawe.** *Journal of Cereal Science* 17(3); 1993; 291-300

The physical and chemical changes that occurred during a 72 h fermentation period were studied in two differently processed maize doughs from Benin, referred to as home-produced and commercial mawe. The pH decreased from 6.1 to 3.5 in the commercial process and from 6.2 to 3.6 in the home-style process, whereas the titratable acidity increased from 0.2 to 1.7% (w/w, lactic acid) and from 0.3 to 2.3%, respectively. Home-produced mawe had significantly higher levels of crude fat, crude fibre and ash compared with the commercial mawe, as a consequence of the difference in the processing methods. No marked changes in proximate composition occurred during subsequent fermentation. Commercial mawe was whiter than home-produced mawe, and this whiteness increased with increasing fermentation time. Fermentation significantly increased the swelling and thickening capabilities of mawe, which were more pronounced in the commercial than in home-produced samples. Overall, the commercial mawe process appeared to be a technologically more advanced and effective method of mawe manufacture than the home process. AA

268

Mestres (C), Colonna (P), Alexandre (MC) and Mateucio (F). **Comparison of various processes for making maize pasta.** *Journal of Cereal Science* 17(3); 1993; 277-290

Maize pasta was produced using various heat treatments such as drum-drying, extrusion-cooking, pasting and steaming. Cooking quality of pasta products were compared and discussed on the basis of starch physico-chemical properties. The best products were obtained by using drum-drying or pasting, whereas the worst product was obtained using extrusion-cooked maize starch. This was interpreted in terms of starchy component degradation and amylose retrogradation ability. The treatment of fresh pasta at high temp. (95°C) with high RH (95%) improved pasta quality: after 1 h under these conditions, cooking losses were decreased by 9%. Addition of monoglycerides also significantly improved pasta cooking quality by making complexes with amylose during pasta cooking. In contrast, cold storage promoted amylopectin retrogradation and scarcely improved maize pasta quality. AA

269

Saulnier (I), Mestres (C), Doublier (J-L), Roger (P) and Thibault (J-F). **Studies of polysaccharides solubilized during alkaline cooking of maize kernels.** *Journal of Cereal Science* 17(3); 1993; 267-276

Polysaccharides solubilized during alkaline cooking of maize kernels are acidic heteroxylans. They contain mainly xylose (60%), arabinose (34.4%) and galactose (5.6%) as neutral sugars, but also contain glucuronic acid. Ion exchange chromatography showed major acidic (90%) and minor neutral (10%) components. High-performance size-exclusion chromatography with multi-angle laser-light scattering detection exhibited some heterogeneity in mol. wt. distribution, and a weight average mol. wt. of 230k was measured with a polydispersity index of 1.6. These polysaccharides had a polyelectrolyte character, and their intrinsic viscosity ($[\eta]$) determined in 0.1 m NaCl was 141 ml/g. They exhibited the flow behaviour typical of macromolecular sol. with a coil overlap concn (C^*) for $C^*[\eta] = 1.2$. Methylation analysis revealed a highly branched structure, in which only approx. 17% of 4-linked xylose residues are not substituted at O-3 or O-2 and O-3. ^{13}C Nuclear magnetic resonance confirmed these structural features. AA

PULSES

270

Weaver (CM), Heaney (WR), Proulx (WR), Hinders (SM) and Packard (PT). **Absorbability of calcium from common beans.** *Journal of Food Science* 58(6); 1993; 1401-1403

Absorption of Ca from white, red and pinto beans, labeled with ^{45}Ca, was measured in 24 women in a three-way randomized design using a Ca load of 72 mg and milk as the referent. Fractional absorption for the 3 beans averaged 0.219 plus or minus 0.047 and did not differ by type. Milk Ca absorption at the same load was more than two times higher, 0.451 plus or minus 0.088 ($P < 0.001$). Oxalate content averaged 0.34%, and phytate averaged 1.7%, a stoichiometric excess relative to Ca. To evaluate the relation of phytate to reduced absorbability, labeled pinto beans were pre-treated with phytase and fed to 10 subjects. Fractional absorption rose, averaging 0.318 plus or minus 0.071, ($P < 0.01$ vs. untreated beans), but was significantly below that of milk. The difference was partly accounted for by phytate, with the remainder probably due to relatively high oxalate. AA

Dry beans

271

Mafuleka (MM),Ott (DB), Hosfield (GL) and Uebersax (MA). **The role of phytase and lignin in decorticated dry bean (*Phaseolus vulgaris*) hardening during storage.** *Journal* *of Food Processing Preservation* 17(1); 1993; 1-20

The lignification-like mechanism and that involving phytic acid degradation by phytase were evaluated in the hard-to-cook phenomenon of decorticated Malawian white and red bean genotypes (*Phaseolus vulgaris*). Samples were stored under various temp. (16°C; 35°C) a_w; (0.55 a_w; 0.85 a_w) and time periods (4 and 8 months) compared to the control group (2°C; 0.30 a_w; zero months). Phytase activities (Pi), phytic acid, Ca and Mg ions, water soluble pectic substances and lignin concn. were determined spectrophotometrically. Elevated phytase activities and slight, but nonsignificant increase in lignin levels were produced in both bean genotypes maintained under adverse storage conditions for extended time periods. Positive correlations between phytase activities and cooked white bean hardness for the 4 month ($r^2 = 0.844$) (p less than or equal to 0.01) and 8 month ($r^2 = 0.689$) storage periods were found. Lignin content of red beans was significantly (p less than or equal to 0.01) correlated ($r^2 = 0.669$) with hardness for the extended (8 month) storage period. However, no clear relationships were found between lignin levels and the 4 month stored red ($r^2 = 0.232$) and white ($r^2 = 0.210$) bean hardness, and between lignin concn. and the 8 month ($r^2 = 0.232$) stored white bean hardness. The mechanism involving phytic acid degradation appeared to be the dominant system influencing the hard-to-cook defect in the white, and to some extent the red bean genotypes for the storage period 0-8 months. AA

Kidney beans

272

Ho (MF) and Whitaker (JR). **Subunit structures and essential amino acid residues of white kidney bean (*Phaseolus vulgaris*) α-amylase inhibitors.** *Journal of Food Biochemistry* 17(1); 1993; 35-52

Both white kidney bean α-amylase inhibitors WKB 858A (MW 42,000) and WKB 858B (MW 20,000) were composed of two subunits as determined by N-terminal amino acid analysis, by amino acid sequence, by SDS-PAGE and by separation on a chromatofocusing column in 8 M urea. N-Terminal amino acids for inhibitor WKB 8585A were alanine and glycine, with a sequence of H_2N-Ala- Glu-Asn- Ala-Gly-Thr -Tyr---COOH for deglycosylated 19,000 MW peptide and H_2-Gly-Asn---COOH for deglycosylated 12,000 MW peptide. N-Terminal amino acids for Inhibitor WKB 858B were alanine and serine, with a sequence of H_2N-Ala-Thr-Glu-Thr-Ser---COOH for the deglycosylated 9,000 MW peptide and H_2N-Ser-Ala-Val-Gly-Leu-Asp- Phe- Val-Leu-Val-Pro-Val-Gln- Pro-Glu- Ser- Lys-Gly-Asp-Thr- Val-Thr-Val -Glu- Phe- Asp---COOH for the deglycosylated 15,000 MW peptide. Chemical modification of 2 of 7 His residues with diethylpyrocarbonate resulted in 26% loss of inhibitory activity. Modification of 1.5 of 7 Trp residues with N-bromosuccinimide gave 60% loss of inhibitory activity. Modification of 2 of 6 Tyr residues with N-acetylimidazole gave 60% loss of inhibitory activity. Modification of 3.6 of 6 Arg residues with p-hydroxy phenylglyoxal gave 64% loss of inhibitor activity. These results indicate the possible importance of one or more His, Trp, Tyr and perhaps Arg residues for inhibitory activity against porcine pancreatic α-amylase. AA

273

Ho (MF) and Whitaker (JR). **Purification and partial characterization of white kidney bean (*Phaseolus vulgaris*) α-amylase inhibitors from two experimental cultivars.** *Journal of Food Biochemistry* 17(1); 1993; 15-33

α-Amylase inhibitors WKB 858A and WKB 858B were purified to homogeneity from different cvs of white kidney beans by extraction from the ground beans and by sequential heat treatment, ethanol fractionation, DEAE- cellulose chromatography, Sephadex G-75 gel chromatography and CM- cellulose chromatography. The inhibitors were homogeneous by 7.5% polyacrylamide gel electrophoresis; no isoinhibitors were found. Inhibitors WKB 858A and WKB 858B had isoelectric points of 5.0 and 4.65, respectively, and mol. wt. of 42,000 and 20,000, respectively, by FPLC Superose 12 gel filtration chromatography. Inhibitor WKB 858A had mol. wts of 40,000 and 38,000 by Sephadex G-75 gel filtration chromatography and by native gel electrophoresis, respectively. Inhibitor WKB 858A contained 11.0% carbohydrate, N-linked to asparagine residues, with a composition of 1 fucose, 1 xylose, 4 galactose, 8 N-acetylglycosamine and 13 mannose residues per mol. of inhibitor. Amino acid analysis of Inhibitor WKB 858A gave a high content of Asx, Glx, Ser, Thr and Val (combined total of 60%) molar ratio and low content of sulphur amino acid (0.8% molar ratio of Met and no 1/2 cystine). No SH-groups were found. The amino acid composition was similar to that of 8 other α-amylase inhibitors from beans. Inhibitor WKB 858A formed a 1:1 stiochiometric complex with porcine pancreatic α-amylase with a K_I of 1.0×10^{-11} M at pH 5.4 and 30°C; it had no trypsin inhibitory activity. At pH 6.90 and 30°C, the rate of complex formation between Inhibitor WKB 858A and porcine pancreatic-α-amylase was 2.76 times faster at 1.385 vs 0.035 ionic strength (with Na_2SO_4), indicating hydrophobic bonds are most important in complex formation. AA

Pinto bean

274

Czarnecki (Z), Gujska (E) and Khan (K). **Enzyme - pretreatment of pinto bean high protein fraction and time of blending corn meal affects extrudate properties.** *Journal of Food Science* 58(6); 1993; 1404-1406

High protein fraction of pinto bean, treated with papain and cellulase enzymes (Solvay Enzymes Inc.), was blended with corn meal (30%) and extruded at 120°C. Changes in expansion, texture, colour, pH, *in vitro* protein digestibility, reducing sugars and functional properties of extrudates were recorded. Changes depended on type of enzymes and time of corn incorporation (before or after enzymatic pretreatment). The best texture of the extrudates was obtained using a cellulase enzyme. Papain affected some functional properties such as NSI and WSI. The best improvement in *in vitro* protein digestibility and reducing sugars was found with a cellulase treatment. Protein and fiber could be modified to improve physicochemical and functional properties of extrudates. AA

Vanilla beans

275

Adedeji (J), Hartman (TG) and Chi-Tang (H). **Flavour characterization of different varieties of vanilla beans.** *Perfumer and Flavourist* 18(2); 1993; 25-32

The aroma characterization of vanilla beans from different geographical location with a view to developing a database of information to be used as an indication of geographical origin and bean quality are described. Bourbon-A, Tahitian, Bali-A, Java, Bourbon-B, Bali-B, Mexican, Tonga, Costa Rican, Jamaican are the var. studied. Flavour and aroma in these var. is made up of wide var. of organic compounds, mostly aldehydes, ketones, acid, alcohols, esters, ethers, long-and-short-chain hydrocarbons, oils, waxes and resins. SRA

OILSEEDS AND NUTS

Groundnuts

276

Prinyawiwatkul (W), Beuchat (LR) and McWatters (KH). **Functional property changes in partially defatted peanut flour caused by fungal fermentation and heat treatment.** *Journal of Food Science* 58(6); 1993; 1318-1323

Changes in functional properties of flour made from partially defatted peanut fermented with *Rhizopus microsporus* var. *oligosporus* and treated with steam were investigated. An ester-like aroma was detected in fresh fermented peanut and soy sauce or meat-like flavours were detected in dried fermented peanut. Nitrogen solubility (pH 4.0-6.0), emulsion capacity and viscosity, water adsorption, and water and oil retention of flours were slightly increased as a result of fermentation. Steam treatment of non-fermented and fermented peanut flours for up to 45 min enhanced some functional properties. AA

277
Muego-Gnanasekharan (KF) and Resurreccion (AVA). **Physicochemical and sensory characteristics of peanut paste as affected by processing conditions.** *Journal of Food Processing Preservation* 17(5); 1993; 321-336

The effects of temp. and number of water extractions on lipoxygenase colour, instrumental textural properties, hexanal in headspace volatiles, and sensory characteristics of peanut paste were determined. Water extraction at 90°C for 10 min at least three times produced a more spreadable paste with less volatile hexenal and raw beany flavour than pastes subjected to the different treatments studied. RN

Soybeans

278
Kermasha (S), Bisakowski (B), Ramaswamy (H) and Van de Voort (FR). **Thermal and microwave inactivation of soybean lipoxygenase.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 215-219

The inactivation of commercial soybean lipoxygenase was studied at various temp. using conventional and microwave heating. Conventional heating was carried out in a temp. controlled water-bath, while a custom designed microwave temp. control system was used to maintain test samples at selected temp. either by full exposure to microwaves (microwave heating) or partial exposure by immersion in water (in a beaker) maintained at the desired temp. using the microwave oven (mixed mode). Lipoxygenase inactivation was evaluated using first-order reaction kinetics. Conventional and mixed mode heating produced somewhat similar results while the microwave mode resulted in a more rapid inactivation of the enzyme. The activation energies (E_a) were 119, 113 and 180 kJ/mol, respectively, for the conventional, mixed and microwave mode heating. Higher enzyme inactivation rates under microwave heating conditions were ascribed to possible non-thermal effects. AA

Soy proteins

279
Myers (DJ). **Industrial application for soy protein and potential for increased utilization.** *Cereal Foods World* 38(5); 1993; 355-360

Aspects outlined in this article are the production of soy products and commercial soy protein products, utilization of soy proteins in industries, its applications in adhesives, paper coating, plastics, textiles, the potential and barriers for the increased utilization of soy products and the future growth of soy protein markets. CSA

TUBERS AND VEGETABLES

Root vegetables

Carrots

280
Tatsumi (Y), Watada (AE) and Ling (PP). **Sodium chloride treatment or waterjet slicing effects on white tissue development of carrot sticks.** *Journal of Food Science* 58(6); 1993; 1390-1392

Treatment of carrots with NaCl sol. or slicing with a high pressure water jet stream was evaluated for reducing the amount of white tissue development or carrot stick surfaces. A 0.5 or 1.0M sol. treatment resulted in less white tissue than treatment with lower concn. of NaCl. However, the NaCl treatment caused a wt. loss of 4-10% (not commercially acceptable). Water jet slicing resulted in striation of surface tissue and left loose layers of cells, as observed with the scanning electron microscope. These cells dehydrated rapidly and formed as much white tissue as on carrots sliced with a culinary knife. AA

Cassava

Gari

281
Akingbala (JO), Oguntimein (GB) and Bolade (MK). **Effect of unit operations of production**

on the cyanide content and the acceptability of gari. *Journal of Food Processing Preservation* 17(5); 1993; 337-350

The effect of holding, pressing, initial moisture content, sun heating, and garifying, on pH, total titrable acidity (TTA) and residual cyanide content of cassava mash, cake and *gari* were evaluated. A new method to make *gari* with very low residual cyanide was developed. Increasing holding time decreased pH, cyanide content, but increased (TTA) of mash and *gari* when initial moisture content of mash was greater than or equal to 63-65%. The optimum holding time was 72 h. Sensory properties of *gari* prepared by the new lab. method were similar to those of gari produced by traditional method. RN

Tubers

Potatoes

282

Eshtiaghi (MN) and Knorr (D). **Potato cubes response to water blanching and high hydrostatic pressure.** *Journal of Food Science* 58(6); 1993; 1371-1374

High hydrostatic pressure treatment (400 MPa, 15 min, 5-50°C) of potato cubes (2 x 2 x 2 cm) was compared with hot water blanching (100°C, 30-180 sec). Inactivation of microorganisms and polyphenoloxidase, texture and density change, leaching of potassium and loss of ascorbic acid were monitored. Reduction of microbial counts was comparable for both methods and polyphenoloxidase was completely inactivated at 20°C, when dilute citric acid sol. (0.5 or 1.0%) were used as "immersion" medium. Hot water blanching and high pressure treatment resulted in samples of similar softness. Leaching of potassium was reduced 20% after pressure treatment on vacuum-packaged samples. Retention of ascorbic acid in pressure-treated samples was temp. dependent ranging from approx. 90% at 5°C to approx. 35% at 50°C. AA

283

Mondy (NI), Subash Chandra and Munshi (CB). **Zinc fertilization increases ascorbic acid and mineral contents of potatoes.** *Journal of Food Science* 58(6); 1993; 1375-1377

The effects of Zn fertilization on ascorbic acid and mineral concn. of Katahdin potatoes were investigated over 2 yr. During the first yr $ZnSO_4$ was banded during planting at rates from 11.2 to 224 kg/ha in 2 locations in New York. During the second yr $ZnSO_4$ was banded during planting at rates of 0, 22.4, 44.8 and 112 hg/ha at one of the locations. Ascorbic acid content of tubers was higher only with the 112 Kg/ha $ZnSO_4$ treatment. Zn fertilization resulted in higher Zn concn. in tubers during both yrs and at both locations. Zn fertilization increased amounts of Ca, Mn, Cu, Al and Co but did not affect Cd content in potato tubers. AA

284

Munshi (CB), Cary (EE) and Mondy (NI). **The effect of soil entrapment by the periderm on the mineral element composition of potatoes.** *Journal of Food Quality* 16(1); 1993; 45-55

Potato cvs 'Katahdin', 'Norkwig Russet' and 'Shepody' cultivated on uncontaminated soil and titanium as marker element to correct for contamination by soil were used. Soil entrapment significantly increased tuber mineral element concn., especially Ca and Mg concn. and microelements, especially Al (95%), Fe (88%) but Mn less (4%) and Cd, Co, Cu and Zn none. Highest concn. of elements including Al were in the peel and least in the pith. Accumulation of mineral elements in peel (rougher peel with greater soil entrapment) differed between the cvs. Boiling significantly decreased macroelements and increased microelements in the peel. With tubers grown in contaminated soils, peeling before cooking would remove the nutritionally undesirable mineral elements. SD

285

Mondy (NI), Uma Reddy and Munshi (CB). **Effect of packaging material on the quality of potatoes treated with isopropyl N-(3-chlorophenyl) carbamate (CIPC).** *Journal of Food Quality* 16(5); 1993; 393-403

Katahdin and Russet Burbank potatoes, treated with isopropyl N-3(-chlorophenyl) carbamate CIPC and stored for 4 months at 5°C in either mesh or polyethylene bags (2 packaging materials frequently used for potato storage), were tested for enzymatic discoloration, phenolic and ascorbic acid concn. CIPC residues in tubers stored in polyethylene bags were significantly ($p < 0.01$) higher than those stored in mesh bags. Tubers stored in polyethylene showed significantly ($p < 0.05$) higher discoloration and phenolic concn., and lower ascorbic acid concn. than those stored in mesh bags. Differences in CIPC retention of the tubers stored in the two packaging materials may have been responsible for some of the differences in quality factors since CIPC was shown to significantly ($p < 0.01$) increase the enzymatic discoloration and phenolic concn., and decrease the ascorbic acid concn. of both cvs. AA

Yam

286

Nok (AJ), Gimbo (CE), Kagbu (JA) and Ogbadoyl (EO). **Kinetic studies and mechanism of catalysis of malic dehydroxygenase from *Dioscorea rotundata* tuber.** *Journal of Food Biochemistry* 16(6); 1993; 339-347

The kinetic mechanism (k_m) values of catalysis by yam malic dehydrogenase showed an ordered sequential mechanism (SM). The K_m values obtained from secondary plots were 0.05, 0.08, 0.48 and 2.56 mM for NADH, OAA and NAD^+ and L-malic acid respectively. Product inhibition studies in both the forward and backward reactions support an ordered Bi-Bi SM. This begins with an obligatory binding of NAD^+ to form the first binary complex and a final release of NADH. BV

Vegetables

287

Heaney (RP), Weaver (CM), Hinders (SM), Martin (B) and Packard (PT). **Absorbability of calcium from brassica vegetables: Broccoli, bok choy and kale.** *Journal of Food Science* 58(6); 1993; 1378-1380

Absorption of Ca from 3 intrinsically labeled *Brassica* sp. vegetables was measured in 15 normal women in a 3-way randomized design. The test load of Ca was about 83 mg for each source. Fractional Ca absorption from broccoli averaged 0.478 plus or minus 0.089, from bok choy stems, 0.519 plus or minus 0.089, from bok choy leaves, 0.520 plus or minus 0.074, and from kale 0.527 plus or minus 0.091. These differences were both absolutely small and statistically insignificant. Mean absorbability of milk calcium ingested at the same load has been previously shown to be 0.463 plus or minus 0.095. This value is slightly but significatly lower than the av. value for the *Brassica* sources combined (0.514 plus or minus 0.090). Thus, *Brassica* vegetable sources exhibit excellent Ca bioavailability. AA

Bitter gourd

288

Mohammed (M) and Wickham (LD). **Extension of bitter gourd (*Momordica charantia* L.) storage life through the use of reduced temperature and polyethylene wraps.** *Journal of Food Quality* 16(5); 1993;371-382

Bitter gourd fruits were stored individually wrapped in low density polyethylene (LDPE) film or unwrapped for up to 21 days at 5-7°C, 20-22°C and 28-30°C, respectively. Assessment was done on several quality parameters including marketable quality. Storage of film-wrapped fruit at 5-7°C resulted in extension of shelf-life in excess of two wks and delayed appearance of chilling injury symptoms. Additionally, film-wrapped fruits stored at 5-7°C were still marketable after 21 days, had lowest fresh wt. losses, less softening, reduced incidence of postharvest rots and minimal changes in vitamin C content and pH. Storage of individually wrapped fruits at reduced temp. therefore offers an effective method of prolonging the shelf-life of bitter gourd. AA

Cucumbers

289

Guillou (AA) and Floros (JD). **Multiresponse optimization minimizes salt in natural**

cucumber fermentation and storage. *Journal of Food Science* 58(6); 1993; 1381-1389

Response surface methodology was used during natural cucumber fermentation and storage to quantitatively determine effects on NaCl (0-10%), $CaCl_2$ (0-0.4%) and potassium sorbate (0-0.4%) on brine pH, cucumber texture and microbial (yeast/mold) contamination. Multiresponse optimization methods (conventional and improved graphical methods, extended response surface procedure and desirability function approach) were employed to minimize use of NaCl. Cucumbers fermented and stored in brines containing approx. 3% NaCl, 0.28% $CaCl_2$ and 0.3% potassium sorbate were predicted to exhibit vigorous fermentation, be free of yeast/mold contamination, and maintain good firmness after 6 months storage. Predicted results were experimentally confirmed. AA

290

Brigance (AR) and Buescher (R). **Effect of ozone on softening enzymes, sorbate, pigment and bacteria in recycled pickle brine.** *Journal of Food Biochemistry* 16(6); 1993; 359-369

Recycled cucumber pickle brine (RCPB) treated with O_3 (176 to 246 µg/ml of recycled brine that was added in 10-14 min) showed inactivation of cellulase (CX) and polygalacturase (PG). Potassium sorbate and bacteria were also destroyed in RCPB and brine colour faded at 400 nm. Utilization of O_3 provides an alternative method for inactivating CX and PG in RCPB; however, the effects of O_3 treated brines on cucumber fermentation and subsequent pickle quality must be evaluated. BV

Leafy vegetables

Lettuce

291

Albrecht (JA). **Ascorbic acid content and retention in lettuce.** *Journal of Food Quality* 16(4); 1993; 311-316

Ascorbic acid content of locally grown lettuce cvs ranged from 9-24 mg ascorbic acid/100 g which is greater than the reported values and for purchased lettuce cvs it ranged from 3-14 mg/100 g. Ascorbic acid retention for lettuce cvs stored for 1 wk ranged from 40-74% for 2 wks stored ones 8-68%. SD

Tomatoes

292

Tucker (GA). **Improvement of tomato fruit quality and processing characteristics by genetic engineering.** *Food Science and Technology Today* 7(2); 1993; 103-108

The potential traits of tomato fruit that could be manipulated by genetic engineering; properties of cell wall polyuronides in normal and genetically engineered fruits; genetic manipulation of pectolytic activity in tomato fruit; enzyme activities in normal and genetically engineered ripe tomato fruit are outlined. GS

FRUITS

293

Lurie (S). **Modified atmosphere storage of peaches and nectarines to reduce storage disorders.** *Journal of Food Quality* 16(1); 1993; 57-65

LDPE film of 40 micron thickness extended the storage life of peaches and nectarines and decreased internal flesh breakdown and reddenning while polyolefin film was ineffective. Six fruits per pack generated higher CO_2 (which improved the fruit quality) and lowered O_2 than 2 or 4 fruits per pack. SD

294

Lal (BB), Joshi (VK), Thakur (NS) and Goel (S). **Fruit marketing in plastic containers - a big relief to foresters.** *Packaging India* 26(5); 1994; 11, 13, 14

The use of plastic cartons and crates in apple and plum trade, for packaging, trasportation, marketing, storage and the physiology of fruits in the plastic containers is discussed in this article. CSA

Apples

295

Pizzacaro (F), Torreggiani (D) and Gilardi (G). **Inhibition of apple polyphenoloxidase (PPO) by ascorbic acid, citric acid and sodium chloride.** *Journal of Food Processing Preservation* 17(1); 1993; 21-30

The study conducted with 'Golden Delicious' apple cubes showed that dipping in ascorbic acid (0.2 - 10 g/l range) and in NaCl (0.2 - 1 g/l range) sol. for 5 min increases the PPO activity. Citric acid sol. have little or no inhibition. 90 - 100 PPO inhibition was obtained with a 5 min dip in mixtures of ascorbic acid - citric acid(10 + 2 g/l) and ascorbic acid - sodium chloride (10 + 0.5 g/l). RN

296

Paoletti (F), Moneta (E), Bertone (A) and Sinesio (F). **Mechanical properties and sensory evaluation of selected apple cultivars.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 264-270

Selected commercial apple cvs. (Golden Delicious, Stark Delicious, Renetta, Annurca, Granny Smith, Emperor) were studied to discriminate among the cvs and the different levels of merceological quality for their mechanical and texture characteristics, by instrumental and sensory methods. Single compression, double compression and penetration tests were carried out to determine mechanical and texture properties of the apple flesh (failure stress and strain, modulus of deformability, juiciness, cohesiveness and firmness). Sensory responses were obtained by the descriptive technique of texture profile analysis and by the pairwise ranking test (paired comparisons of more than 2 samples) for the following parameters: fracturability, firmness, cohesiveness, mealiness and juiciness. Annurca and Granny Smith cvs showed the highest values for almost all the instrumental and sensory parameters measured. The instrumental methods indicated that the internal variability of flesh structure influenced the differences among the cvs, although some significant differences were clear. Results from the correlation study between instrumental and sensorial parameters were affected by the non-homogeneous distribution of the values in the correlation plots, probably due to the low number of samples considered. Principal component analysis applied to the instrumental results showed that the first two components described about 85% of the total variance. The first component was a linear combination of 5 variables, excluding the failure strain, while the second was a failure strain factor. It seems that only two parameters, the failure stress for instance and the failure strain, would be sufficient to point out differences among the cvs and the merceological quality levels considered. AA

Limes

297

Sierra (CC), Molina (EB), Zaldivar (CP), Flores (LP) and Garcia (LPDL). **Effect of harvesting season and postharvest treatments on storage life of Mexican limes.** *Journal of Food Quality* 16(5); 1993; 339-354

Mexican limes were coated with wax applied through spraying or dipping and treated with thiabendazole (TBZ) at 500 p.p.m. and gibberellic acid (GA3) at 250 p.p.m. and stored at 8, 10 and 20°C at 85-90% RH. Wt. loss, % of juice, °brix, titratable acidity, colour development and severity of chilling injury were obtained at weekly intervals. Limes harvested in July during the max. production period retained 90.6% of their fruit marketability compared to those harvested in September. Waxing by dipping + TBZ at 500 p.p.m. + GA3 at 250 p.p.m. and 10°C, 85-90% RH gave the best quality. SD

Nectarines

298

Von Mollendorff (LJ), de Villiers (OT), Jacobs (G) and Westraad (I). **Molecular characteristics of pectic constituents in relation to firmness, extractable juice, and woolliness in nectarines.** *Journal of the American Society for Horticultural Science* 118(1); 1993; 77-80

The differences in the composition and gelling characteristics of extracted pectins in 'Flavortop' nectarines stored for 4 wk at -0.5°C before being ripened at 15°C or being ripened immediately after harvest was studied. As ripening progressed, the extractable juice in both treatments decreased to low values (11 and 17%) after which it increased with further ripening. Wooliness occured in cold stored nectarines and increased progressively from 13% on the 2nd day of ripening to 85% on the 6th day of ripening. Fruit firmness (FF) decreased by approx. 15.7 N to 82.3 N at the start of ripening during 4 wk of cold storage. FF decreased rapidly during ripening in both treatments and stabilized at approx. 19.6 N as fruit became fully ripe. The soluble pectin concn. in both treatments increased at the expense of insoluble pectin as fruit firmness decreased. The extractable juice was lowest when the viscosity of soluble pectins and % of wooly fruit were highest. During ripening at 15°C the mol mass distribution of soluble pectins decreased considerably. SRA

Peaches

299

Lu (JY), Lukombo (SM), Stevens (C), Khan (VA), Wilson (CL), Pusey (PL), Chaultz (E). **Low dose UV and γ-radiation on storage rot and physicochemical changes in peaches.** *Journal of Food Quality* 16(4); 1993; 301-309

Pears

300

Chen (PM), Varga (DM) and Mielke (EA). **Ripening behaviour of 'Columbia' and 'Gebhard' strains of red 'd'Anjou' pears after cold storage.** *Journal of the American Society for Horticultural Science* 118(1); 1993; 81-85

'Columbia' and 'Gebhard' strains of red 'd'Anjou' pears (*Pyrus communis* L.) harvested at similar maturity exhibited different ripening behaviour after monthly removal from 1°C storage in air. 'Columbia' fruit produced ethylene at higher rates than 'Gebhard' fruit during 15 days of ripening at 20°C after each corresponding storage interval. 'Gebhard' fruit required a longer period of chilling than 'Columbia' fruit to generate noticeable rates of ethylene during ripening. The unripened fruit of both strains contained similar amounts of ACC at each corresponding storage interval. At each corresponding ripened state, ACC content in 'Columbia' fruit increased 2 to 3-fold, while that in 'Gebhard' fruit changed very little. After sufficient chilling, 'Columbia' fruit increased 2 to 3-fold, while that in 'Gebhard' fruit also softened but to a lesser extent than 'Columbia' fruit. Ripened 'Gebhard' fruit had only slightly lower levels of EJ than unripened fruit and did not develop a buttery and juicy texture after any storage intervals. Titratable acidity (TA) in fruit of both strains varied between for the 1988 and 1989 seasons but decreased significantly during storage in both years. Soluble solids concn. (SSC) in both strains also varied seasonally but did not change during storage or ripening. AA

Persimmon

301

Ben-Arie (R) and Sonego (L). **Temperature affects astringency removal and recurrence in Persimmon.** *Journal of Food Science* 58(6); 1993; 1397-1400

Astringency was removed from 'Triumph' persimmons by immersion in water at 40°C for 5 h or 60°C, for 1 h. Similar treatments at 20°C and 80°C, had no effect on astringency reduction. Subsequent application of 80% CO_2 for 48 h was effective for 20°C-treated fruit but not for 80°C-treated fruit, which became nonastringent only after exposure to acetaldehyde. Extending the 60°C treatment beyond 2 h resulted in recurrence of astringency, which was not reduced by subsequent CO_2 treatment. Astringency also recurred in CO_2-treated non-astringent fruit, when exposed to high temp. The disappearance and recurrence of astringency correlated with amount of methanol-soluble tannins. AA

Pineapple

302

Fontana (AJ), Howard (L), Criddle (RS), Hansen (LD) and Wilhelmsen (E). **Kinetics of deterioration of pineapple concentrate.** *Journal of Food Science* 58(6); 1993; 1411-1417

Pineapple juice conc. undergoes reactions leading to colour formation and quality loss. Kinetics were studied calorimetrically, spectrally and by chemical analysis. Two exothermic processes occurred between 40 and 80°C, one independent of, and one dependent on O_2 concn. The rate of the O_2 independent reaction decreased exponentially with time, (sucrose hydrolysis). The rate of the O_2 dependent process was constant with time, complex, and not defined. Heat producing reaction rates were not altered by concn. of major sugars/organic acids. Development of colour occurred later than heat production. Colour development had a complex dependence on solids and O_2 concn., and correlated with initial rate of 5-hydroxy-methylfurfural (HMF) formation. CO_2, decrease in titratable amines and amino acids, and loss of reducing agents accompanied colour development. Heat and colour production and chemical changes correlated with sensory quality. AA

CONFECTIONERY, STARCH AND SUGAR

303

Brake (NC) and Fennema (OR). **Edible coatings to inhibit lipid migration in a confectionery product.** *Journal of Food Science* 58(6); 1993; 1422-1425

Coatings containing hydrocolloids and sweeteners were tested for lipid barrier and sensory properties, adhesion to chocolate, viscosity, and a_w. A coating containing high methoxyl pectin, acacia gum, high fructose corn syrup, dextrose, fructose, and sucrose was most effective. Coatings (0.5 mm thick, a_w 0.5) showed no detectable oil migration after 47 days at 30 plus or minus 1°C, compared to 11.5 mg/cm^2 trilinolein equivalents migration in 1 day at 21 plus or minus 2°C. Coatings (0.5 mm thick) were applied between chocolate and peanut butter and tested for sensory characteristics. Except for the colour of the coating, no significant difference occurred in overall preference compared to control (no coating) samples. AA

304

Sreenath (HK). **Hydrolysis of carboxymethyl celluloses by cellulases.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 224-228

Water soluble carboxymethyl celluloses (CMCs) were hydrolysed using food grade commercial cellulases. The CMC hydrolysates obtained had low viscosity and contained mainly celloligomers along with low amounts of cellobiose and glucose. A viscosity reduction of 98 to 99% was achieved after 5 min of cellulolytic hydrolysis of CMCs. On the other hand, acid hydrolysis of CMC was slow and took 1 h to reach a viscosity reduction of 93% and the hydrolysate contained high amounts of glucose in the reaction mixture. Cellulase from *Trichoderma viridae* produced 2 to 4 times more glucose in the CMC hydrolysate compared to cellulase from *Aspergillus niger*. Thus, the latter contained probably higher endo- and lower exo-β-(1-4)-glucanase activity than the former. The amount of glucose in the reaction mixture was further monitored by optimizing various factors influencing the cellulolytic hydrolysis of CMCs, such as pH, temp., time of reaction, substrate and enzyme concn. and type of CMC itself. AA

305

Raja (KCM) and Ashok Pandey. **Recent trends in carbohydrate research. Proceedings of the 8th carbohydrate conference. 18th - 20th November 1992, Trivandrum, India.** 1-275; 1992

The proceedings on recent trends in carbohydrate research covers titles such as chitin, chitosan and their derivatives, production and applications by Ramachandran Nair, K. G.; and Madhavan, P (pp. 59-65); status of cassava starch research a national scenario by Raja, K. C. M. (pp 74-79); scope and development of guar gum industry in India by Mathur, N. K. and Mathur, V. (pp 80-82). The chemical basis of differences in eating quality of rice by Bhattacharya, K. R. (pp 112); carbohydrates and Ayurveda by Warrier, N. V. K.; distribution of anhydroglucose chains in rice amylopectin and its relation to rice quality by Radhakrishna Reddy, K. et al (pp 149-158); polyols from sugars by Gehlawat, J. K. (pp 159-164); influence of some physiologically active organic compounds on lactic acid and alcoholic fermentation by Singh, S. P. et al (pp 173-175); maltose rich syrups: new sweeteners for Indian market by Thacker, S. P. et al (pp 223-225); studies on the production of maltodextrin syrup from cassava starch using microwave energy by Abraham, T. E. (pp 226-230); an improved method of production of high quality agar from Indian sea weeds by Mathew, P. T. et al (pp 231-234); effect of domestic processing (roasting and malting) on carbohydrate content, starch digestibility (*in vitro*) and viscosity of ready-to-eat home made supplementary foods by Saroj Dahiya and Kapoor, A. C. (pp 235-241); utilization of microbial and polysaccharides in milk based products by Sushma Thakur and Prasad, M. S. (pp 242-245); studies on breadmaking from sprouted wheat by payannavar, C. S. et al (pp 248-252); behaviour of some gums towards interaction with wheat starch: effect of germination by Poonam Sethi et al (pp 253-256) and bead form of guaran gel for chromatographic column packing by Subodh Kumar et al (pp 257-259). CSA

BAKERY PRODUCTS

306

Collar (C) and Martinez (CS). **Amino acid profiles of fermenting wheat sour doughs.** *Journal of Food Science* 58(6); 1993; 1324-1328

Unfermented wheat sour dough (USD) and fermented wheat sour doughs (FSD) started with *Lactobacillus plantarum* were analysed for their free amino acid profiles. Individual and total free amino acid levels of USD and FSD were closely dependent on processing conditions, particularly for FSD samples. A wide range of values in total amino acid content (mg/100 sour dough d.b) was obtained with USD (40.30 mg to 119.24 mg) and FSD (22.40 mg to 230 mg) samples. Predominant groups of amino acids included dicarboxylic acids and amides -18.44 to 51.49 mg (USD), 4.93 mg to 37.33 (FSD) - and aliphatic amino acids -7.17 to 22.01 mg (USD), 5.13 to 94.04 mg (FSD), while hydroxyl (< 9.43 mg) and sulphur containing (< 8.61 mg) amino acids constituted minor components. Aromatic (up to 40.63 mg) and basic (upto 83.02 mg) components were prominent in FSD. GS

307

Goedeken (DL) and Tong (CH). **Permeability measurements of porous food materials.** *Journal of Food Science* 58(6); 1993; 1329-1331

A technique to determine the permeability of porous food materials and to establish the relationship between permeability and porosity, fat content and moisture content for a pre-gelatinized dough sample was developed. Porosity was the only parameter which directly influenced permeability which ranged from 0.02 darcies at 0.10 porosity to 23 darcies at 0.060 porosity. The relationship between permeability and porosity for dough was different than that for granular particles. Permeability was not directly affected by moisture content < 50% and fat content to 6%. GS

308

Kieffer (R), Belitz (H-D), Zweier (M), Ipfelkofer (R) and Fischbeck (G). **A 10-g micro-version of the rapid-mix-test.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 134-136 (De)

A micro-baking test for 10-g flour (MRMT) was developed which corresponds to the standard baking test (RMT) as far as technically possible with respect to formula, preparation and processing of the dough. It was shown for 31 winter wheat var. (harvest 1990) from one location in Bavaria that the bread volumes obtained by MRMT and RMT are highly correlated (r = 0.904). The properties of dough and bread can also be judged very well by the MRMT. AA

Bread

309

Antuna (B) and Martinez-Anaya (MA). **Sugar uptake and involved enzymatic activities by yeast and lactic acid bacteria: Their relationship with breadmaking quality.** *International Journal of Food Microbiology* 18(3); 1993; 191-200

This paper reports information on the uptake mechanisms for the main sugars (maltose, sucrose, glucose and fructose) present in wheat doughs, by yeast strains (*Saccharomyces cerevisiae, Candida guilliermondii* and *Sacch. fructuum* and lactic bacteria (*Lactobacillus plantarum, Lact. brevis, Lact. cellobiosus, Enterococcus faecium* and *Leuconostoc mesenteroides*) isolated from wheat doughs. The activity of the enzymes α-glucosidase and β-fructosidase involved in the metabolism of these sugars is also determined. *Sacch. cerevisiae, C. guilliermondii, Lact. plantarum* and *L. brevis* showed good performance, while *L. cellobiosus* and *E. faecium* and *Sacch. fructum* yielded bread of lower quality. *Leu. mesenteroides* used in combination with other strains led to high quality starters. All yeast strains assimilated glucose, fructose and maltose (saturable kinetics). Lactic acid bacteria showed saturable kinetics only for hexose, while disaccharideuptake was linear. These results indicate good correlation between the parameters evaluated and bread making potential of the microorganisms. SRA

MILK AND DAIRY PRODUCTS

310

Jacquet (Ch), Rocourt (J) and Reynaud (A). **Study of *Listeria monocytogenes* contamination in a dairy plant and characterization of the strains isolated.** *International Journal of Food Microbiology* 20(1); 1993; 13-22

Three hundred and forty samples were analysed for the presence of *Listeria* 44 *L. monocytogenes* and 17 *L. innocua* were isolated from 4 var. of cheese, cheese brines, process equipment and plant environment. *L. monocytogenes* strains were recovered during the ripening and rind washing stages. The characterization of the isolated *L. monocytogenes* strains by serotyping and phage typing showed different serovars and phagovars. Some strains with the same serovar and phagovars were isolated from cheeses and process equipment indicating that cheese contamination occurs during ripening. Only one profile was found from the analysis of the ribonucleic acid gene restriction patterns of 38 *L. monocytogenes* strains with different serovars and phagovars, suggesting that all *L. monocytogenes* strains isolated in the dairy plant could have been derived from a single ancestral group. SRA

Milk

311

Kadan (RS), Ziegler (GMJr), Bett (KL), Grimm (CC), Vercellotti (JR), Wan (PJ). **Stability of dried filled milks.** *Journal of Food Science* 58(6); 1993; 1294-1299

Samples of dried filled milk (DFM) were made with several vegetable fats and compared with dried milk. Several specially prepared vegetable oils, such as Trisun HS-500, hydrogenated cottonseed oil and hydrogenated coconut oil could impart stability to the DFM as high as that imparted by milk fat to conventional dried milk. Stability could be further enhanced by appropriate antioxidant and storage conditions. The simple technique of measuring oxygen consumption by the DFM was as effective as flavour evaluation, GC of volatiles, or spectroscopy for screening large numbers of samples or as a quality control procedure. AA

312

Imafidon (GI) and Farkye (NY). **Rennet coagulability of high-heat treated milk influenced by time of pH adjustment.** *Journal of Food Science* 58(6); 1993; 1300-1302

The coagulability of high-heat treated (91°C for 16 or 60 sec) milk was measured with a Formagraph. Coagulation (hysteresis) and curd formation by such milk was increased by direct acidification to pH < 6.4 before rennet addition. Coagulation properties were increased greatly when such milk was pH-cycled (i.e., acidified to pH 5.5, held overnight at 4°C, then neutralized to pH 6.2 - 6.4) before rennet addition. AA

313

Siva (CV), Patel (DA) and Sannabhadti (SS). **Microbiological status of raw and pasteurized milk.** *Indian Journal of Dairy Science* 46(2); 1993; 62-66

The microbiological status of raw milk at various stages (individual producers, collection centres and dairy plant) of collection and of pasteurized milk was investigated. The microbiological quality of raw milk samples was far from statisfactory. The pasteurized milk samples was found satisfactory. The high counts in raw milk samples indicate unhygienic practices of production and handling at farm and during transportation. SRA

314

Ehsani (MR), Schmidt (RH) and Myers (PO). **Effects of cottage cheese whey on the properties of ice milk.** *Journal of Food Quality* 16(4); 1993; 253-261

Liquid cottage cheese whey levels 16, 31, 46 and 61% were used to produce slightly acidic ice milk mixes. Whey levels 46 and 61% reduced the sensory acceptance of the ice milk and also resulted in precipitation problem. Cottage cheese whey level from 0 to 31% did not significantly influence the consistency index (k) of the ice milk mix but the ice mixes exhibited pseudoplastic behaviour (n value less than unity). Cottage cheese whey level 16% resulted in slightly higher overrun than 0% and 31% but the sensory quality (flavour, texture, sourness) was comparable to the control. 46% panelists preferred control, 32.5%, 16% and 21.5%, 31% whey formulations. SD

315

Chawan (CB), Penmetta (PK), Veeramachaneni (R) and Rao (DR). **Liposomal encapsulation of β-galactosidase effect of buffer molarity, lipid composition and stability in milk.** *Journal of Food Biochemistry* 16(6); 1993; 349-357

Lactose hydrolysis was negligible in milk containing liposomes with bacterial β-gal, while there was significant (25) hydrolysis of lactose in milk containing liposomes with fungal β-gal during 20 days of storage at 4°C. Results of this study suugest that liposomes containing β-gal can be prepared and added to milk without affecting the lactose content for up to 20 days of refrigeration (4°C). BV

316

Initveld (PH), Soentoro (PSS) and Notermans (SHW). **Properties of *Bacillus cereus* spores in reference materials prepared from artificially contaminated spray dried milk.** *International Journal of Food Microbiology* 20(1); 1993; 23-36

317

Jeurnink (TJM) and De Kruif (KG). **Changes in milk on heating: viscosity measurements.** *Journal of Dairy Research* 60(2); 1993; 139-150

Skim milk was heated at 85°C for different holding times. Due to heating, whey proteins, in particular β-lactoglobulin, denaturated and associated with casein micelles. The casein micelles became larger after heating and acquired mutual attraction. GS

318

Mottar (J), de Block (J), Merchiers (M), Vantomme (K) and Moermans (R). **Routine limulus amoebocyte lysate (LAC) test for endotoxin determination in milk using a toxinometer ET-201.** *Journal of Dairy Research* 60(2); 1993; 223-228

A rapid method of performing the Limulus amoebocyte lysate (LAL) test in milk is proposed using the Toxinometer ET-201. This instrument measured the increase in turbidity due to the interaction between the endotoxins of the Gram negative bacteria and the LAL reagent, monitored the ratio R_l of the sequential to the initial transmission at 12 sec intervals and quantified endotoxins by detn. of the reaction time T_r required to obtain a 5% decrease in R_t. There was a good correlation between the toxinometrically determined endotoxin concn. and the number of Gram-negative bacteria (SD, 0.18 log (plate count units)), and the repeatability (CV, 6-10%) was high. The assay may be useful for screening raw materials for UHT milk production, as the endotoxin content of the raw material is related to the rest proteinase activity in the UHT milk. AA

319

Vidal-Valverde (C) and Redondo (P). **Effect of microwave heating on the thiamin content of cow's milk.** *Journal of Dairy Research* 60(2); 1993; 259-262

Three types of commercial ultra high temp. (UHT) milk containing different levels of fat (1) whole milk 3.43% (2) low-fat milk 1.46% and (3) skim milk 0.10% were studied under two different conditions of microwave heating. There was a decrease in milk thiamin due to microwave heating. After reaching a temp. of 53°C (2 min heating), the percentage of thiamine fell to 75.8% for whole milk, 53.8% for low-fat milk and 51.2% for skim milk. Losses of thiamin were greater when heating time increased to 4 min (79°C). The values for thiamin retention were 45.4, 38.5 and 34.1% for whole, low-fat and skim milk respectively. Milk fat helps to prevent the destruction of thiamin through heating. GS

Milk products

320

Henle (T), Walter (AW) and Klostermeyer (H). **Detection and identification of the cross-linking aminoacids Nτ- and Nθ-(2'-amino-2'-carboxy-ethyl)-L-histidine ("histidino alanine", HAL)) in heated milk products.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 114-117

An unknown ninhydrin positive compound X, was detected in acid hydrolysates of heated skim milk samples by amino acid analysis, eluting between phenyl-alanine and pyridosine in the chromatogram. The formation of X correlated with heating time and temp., preparative ion-exchange chromatography enabled the isolation of X and a second minor compound from a milk protein hydrolysate and from a model mixture consisting of Nα-acetylhistidine and methyl -2 -acetamido acrylate (acetyldehydro alaninmethyl ester), in a relative abundance of 8 to 1. By ^{1}H-NMR spectroscopy, the two compounds could be identified as the Nτ- and Nθ-isomers of N-(2'-amino-2'-carboxy-ethyl)-L-histidine (histidinoalanine), a cross-link amino acid that has not been described in food proteins up to now. In a number of foods containing milk protein, the Nτ-histidinoalanine contents were between 50 and 1800 mg/kg protein, which is in a concn. range comparable to the potential nephrotoxic cross-link lysinoalanine, which was determined simultaneously. AA

321

Lametti (S), Giangiacomo (R), Messina (G) and Bonomi (F). **Influence of processing on the molecular modifications of milk proteins in the course of enzymic coagulation.** *Journal of Dairy Research* 60(2); 1993; 151-159

Thermal treatment of milk appeared to affect the accessibility of casein to enzyme action, while homogenization influenced the rate of cooperative aggregation of casein subjects to proteolysis. BV

Cheese

322

Butikofer (U), Ruegg (M) and Ardo (Y). **Determination of nitrogen fractions in cheese: Evaluation of a collaborative study.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 271-275

This study was carried out within the framework of the European COST 902/FLAIR-programme (European Cooperation in the Field of Scientific and Technical Research). The first objective was the harmonization of certain techniques currently used for the detn. of nitrogen fractions of cheese. The second objective was to determine the repeatability (r) and reproducibility (R) of the standardized methods including the detn. of total nitrogen (TN), water soluble nitrogen (WSN), nitrogen soluble at pH 4.4 (SN 4.4), ethanol soluble nitrogen (ESN), nitrogen soluble in trichloroacetic acid (TCA 12-N) and nitrogen soluble in phosphotungstic acid (PTA-N). The r- and R-values for TN were in the range of 0.3 to 1.4 and 1.4 to 2.5 g/kg, respectively. For all other methods tested, the r-values in the range of 0.1 to 1.1% of TN , the R-values were below 3.3% of TN except for ESN (5%). For most cheeses tested, the WSN and SN 4.4 results were highly correlated, as were the TCA12-N and ESN results. Therefore, only a limited number of methods should be applied in practice, other aspects should be considered such as practical and environmental aspects (e.g. toxicity of solvents) and future use of the fractions and the kind of cheese. The difference between the TCA12-N and PTA-N values as well as the difference between SN 4.4 and TCA12-N values were used to characterize protein breakdown. AA

323

Abou-Zeid (NA). **High-fat spreadable processed cheese for people with high blood cholesterol.** *Journal of Dairy Research* 60(2); 1993; 239-245

Part of the raw cheese base used for manufacturing high-fat processed cheese spread was replaced by cows' (C) or buffalo (B) butter residue at level of up to 20%. These residues were produced during the conversion of butter to butter oil by traditional moderate (T) or severe (M) heat treatments. The hypocholesterolaemic properties of butter residues incorporated into processed cheese were tested with rats (serum and liver cholesterol) and human beings (serum cholesterol). When rats were given the control cheese with no butter residue there were significant increases in both serum and liver cholesterol compared with rats given stock diet. However, when part of the raw cheese base was replaced by butter residue these rises were reduced by amounts proportional to the level of butter residue. The hypocholesterolaemic properties of the residues were in order CT > BT, CM > BM, and incorporations of 10% CT, 15% BT, 15% CM and 20% BM were found to nullify the hypercholesterolaemic effects of control cheese and restore cholesterol levels to their normal values. A small human trial gave similar results. Incorporation of butter residue slightly affected the chemical composition of the cheeses. Fat content and pH were little different; however, cheeses with butter residue tended to have higher total protein but lower soluble protein, tyrosine and tryptophan, and total volatile fatty acids. Rheological properties were not altered significantly. Incorporation of butter residue improved the organoleptic properties, particularly flavour intensity. Storage at 5°C for 2 months did not alter the organoleptic properties and changes in chemical composition followed the normal pattern. AA

Camembert cheese

324

Lesage (L), Voilley (A), Lorient (D) and Bezard (J). **Sodium chloride and magnesium chloride affected by ripening of Camembert cheese.** *Journal of Food Science* 58(6); 1993; 1303-1306

Ripening of cheese with 3 kinds of salt treatment was studied using $MgCl_2$, NaCl or a mixture of the two. Proteolysis was followed by detn. of TCA-soluble nitrogen and quantitative electrophoresis. A rapid one-step method for free fatty acids was used to determine short and long-chain fatty acids. In the presence of Mg, proteolysis increased, even with NaCl, which seemed to delay the Mg activation. Lipolysis was retarded by NaCl, which decreased the level of free fatty acids. An imbalance between proteolysis and lipolysis could be responsible for the unpleasant flavour of the cheese containing both $MgCl_2$ and NaCl. AA

Cheddar cheese

325

Bouzas (J), Kantt (CA), Bodyfelt (FW) and Torres (JA). **Time and temperature influence on chemical aging indicators for a commercial Cheddar cheese.** *Journal of Food Science* 58(6); 1993; 1307-1312, 1331

Chemical indicators of Cheddar cheese like residual lactose, organic acid concn. proteolysis, pH and total acidity were quantified and time-temp. effects were evaluated. Cheese in 18 kg blocks collected after pressing at 30-35°C were cooled rapidly to 12-25°C as small pieces and individually vacuum-wrapped at a local production site. Time by temp. interaction was significant ($P < 0.05$) for all indicators except lactose, lactic acid and total acidity. GS

326

Jack (FR), Piggott (JR) and Paterson (A). **Relationships between electromyography, sensory and instrumental measures of Cheddar cheese texture.** *Journal of Food Science* 58(6); 1993; 1313-1317

Cheddar cheeses with a wide range of textural characteristics were differentiated using electromyography (EMG), quantitative descriptive profiling and Instron deformation measurements. Two principal components, accounting for 54% and 24% of the variance in sensory scores respectively, were identified: (1) soft/smooth and hard/coarse, and (2) sticky/mouthcoating and rubbery/chewy. All measured Instron variables discriminated among cheeses and were good predictors of sensory scores. EMG traces of masticatory muscle activity were unique for each subject for different samples, so prediction of sensory perceptions from these data were subject dependent. Correlations between EMG and Instron measurements were observed, but were not consistent from one subject to another. AA

327

Kumar (V) and Tewari (BD). **Effect of processing variables on physico-chemical properties of cheese powder from accelerated ripened Cheddar cheese.** *Indian Journal of Dairy Science* 46(2); 1993; 56-61

This study indicated that the physical quality of cheese powder improved with the increasing total solids of slurry. Addition of trisodium citrate at 3.0% was considered to be the best for manufacturing cheese powder from accelerated ripened cheese. SRA

328

Belitz (H-D) and Kaiser (K-P). **Monitoring Cheddar cheese ripening by chemical indices of proteolysis. 3. Identification of several high-molecular mass peptides.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 118-122

Two Cheddar cheese from 2 different production plants were ripened over 24 wks at 10°C and then analysed for peptides soluble in citrate buffer at pH 4.6 by reversed phase-HPLC. 13 peptides with a chain length of between 35 and 65 amino acid residues and mol. masses between 3800 and 7400 were isolated and assigned to the corresponding amino acid sequences of the casein fractions via Edman degradation and amino acid composition. All peptides were fragments of the region K^{29} - S^{96} of β-casein A^1 and A^2, and 11 of them had M^{93} as the C-terminal. The amounts and proportions of these peptides varied differently during ripening of the 2 cheeses, so they may be suitable markers for characterizing the stage of ripening. AA

Dahi

329

Sharma (NK), Gill (JPS), Joshi (DV) and Kwatra (MS). **Mycoflora of Indian fermented milk product (*dahi*).** *Indian Journal of Dairy Science* 46(2); 1993; 85-87

Analysis of 106 samples of Indian fermented milk product (*dahi*) showed moulds and yeasts < log 1/g in 51.8% and 40.6% respectively. 39 (36.8%) samples contained moulds in the range log1 - log3/g and yeasts in 44 (41.5%) samples. Moulds and yeasts count in the excess of log 3/g were observed in 11.3 and 17.9% of the total samples respectively. The isolates belonged to *Saccharomyces*, *Torulopsis*, *Trichosporon*, *Aspergillus*, *Penicillium*, *Mucor*, and *Fusarium*. SRA

Yoghurts

330

Kneijel (W), Jaros (D) and Erhard (F). **Microflora and acidification properties of yoghurt and yoghurt-related products fermented with commercially available starter cultures.** *International Journal of Food Microbiology* 18(3); 1993; 179-189

Yoghurts and yoghurt-related milk products were produced using 44 commercially available starter cultures from 8 suppliers. The yoghurt starters consisted of the classical yoghurt microflora and the yoghurt-related cultures containing *Lactobacillus acidophilus* and/or *Bifidobacterium* spp. instead of or in addition to the yoghurt bacteria. The counts of lactobacilli in the fresh yoghurts varied between 5.5×10^7 and 6.5×10^8 CFU/ml, and the counts of streptococci varied from 3.5×10^7 to 1.2×10^9 CFU/ml. About 80% of the yoghurts had higher counts of cocci than rods. During storage of the products for 2 wks at 6°C the stability of the microflora differed markedly among the cultures. In the fresh yoghurt-related products the *L. acidophilus* counts ranged from 4.0×10^5 to 2.6×10^8 CFU/ml; bifidobacteria were found at levels between 4.0×10^6 and 2.6×10^8 CFU/ml. In most products reduced viable counts of these bacteria were observed after 2 wks. Titratable acidity increased on average by 22.3% in the yoghurts, and by 14.9% in the yoghurt-related products during storage. In most products a higher amount of L(+)-than D(-)-lactic acid was found. AA

331

Wacher-Rodarte (C), Galvan (MV), Farres (A), Gallardo (F), Marshall (VME), Garcia-Garibay (M). **Yoghurt production from reconstituted skim milk powders using different polymer and non-polymer forming starter cultures.** *Journal of Dairy Research* 60(2); 1993; 247-254

Using polymer producing (ropy) strains of lactic acid bacteria it was possible to reduce considerably the syneresis of yoghurt, even with 12% total milk solids. The viscosities obtained with these strains were also similar to those obtained using normal strains and milk with 17% total solids content. The concn. of milk and the polymer produced by ropy starters had a synergic effect in increasing viscocity. Polymer production was not affected in most cases by milk concn. One type of ropy culture (Wiesby) seemed to produce a different kind of polymer as it could not be determined by alcohol precipitation, in spite of being able to reduce syneresis and increase viscosity in yoghurt. A limited number of yoghurts were evaluated organoleptically, one prepared with a ropy starter strain (NCFB at 12, 14.5 and 17% total solids) and one prepared with a non-ropy strain (LL-I at 17% total solids). The results suggest that the ropy strain yoghurts had different mouthfeel from the non-ropy strain yoghurts; the most acceptable product overall was the ropy strain made with 12% total solids. AA

MEAT AND POULTRY

Meat

332

Ockerman (HW), Harnsawas (S) and Yetim (H). **Inhibition of papain in meat by potato protein or ascorbic acid.** *Journal of Food Science* 58(6); 1993; 1265-1268

The inhibition of papain activity by ascorbic acid, isoascorbic acid, citric acid and potato protein was evaluated and their utilization for permanent inhibition of papain activity in meat was assessed. Ascorbic acid at 2.5×10^{-3} M level inhibited papain in meat but produced an unacceptable off-flavour. At 2.5×10^{-4} M level papain activity retarded, but not completely and produced more acceptable flavour. Potato inhibitor at 0.6, 0.8 and 1.0 mg/ml did not have a significant influence on papain activity in meat. GS

333

Cofrades (S), Careche (M), Carballo (J) and Colmenero (FJ). **Protein concentration, pH and ionic strength affect apparent viscosity of actomyosin.** *Journal of Food Science* 58(6); 1993; 1269-1272

334

Carballo (J), Solas (MT) and Colmenero (FJ). **Effects of different levels of fat on rheological changes and microstructure of meat batters during heat processing.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 109-113

The influence of fat content (5.3% and 20.8%) on the modulus of rigidity (g) only became evident as gel structures began to form, giving higher G values for meat batters the higher the fat content of the sample. Penetration stress and elasticity increased with increase in temp. (between 40 and 70°C) of the product. The work of penetration increased between 40 and 60°C, and remained steady at higher temp. Increased temp. causes the formation of a matrix structure typical of heat-induced protein gels, which became compact and determine the formation of stronger, more elastic structures. Differences in microstructure caused by fat content were more evident at low temp. (40°C). BV

Beef

335

Davies (JE), Chipman (JK) and Cooke (MA). **Mutagen formation in beefburgers processed by frying or microwave with use of flavouring and browning agents.** *Journal of Food Science* 58(6); 1993; 1216-1218, 1223

336

Brewer (MS) and Wu (SY). **Display, packaging and meat block location effects on colour and lipid oxidation of frozen lean ground beef.** *Journal of Food Science* 58(6); 1993; 1219-1223

337

Shand (PJ), Sofos (JN) and Schmidt (GR). **Properties of algin/calcium and salt/phosphate structured beef rolls with added gums.** *Journal of Food Science* 58(6); 1993; 1224-1230

338

Schaake (SL), Means (WJ), Moody (WG), Boyle (EA) and Aaron (DK). **Boning methods and binders affect bind and sensory characteristics of structured beef.** *Journal of Food Science* 58(6); 1993; 1231-1236

339

Merkle (JA) and Larick (DK). **Triglyceride content of supercritical carbon dioxide extracted fractions of beef fat.** *Journal of Food Science* 58(6); 1993; 1237-1240

340

Xiong (YL), Decker (EA), Robe (GH) and Moody (WG). **Gelation of crude myofibrillar protein isolated from beef heart under antioxidative conditions.** *Journal of Food Science* 58(6); 1993; 1241-1244

341

Yin (MC), Faustman (JW), Riesen (JW) and Williams (SN). **α-Tocopherol and ascorbate delay oxymyoglobin and phospholipid oxidation *in vitro*.** *Journal of Food Science* 58(6); 1993; 1273-1276, 1281

342

Harmayani (E), Sojos (JN) and Schmidt (GR). **Fate of *Listeria monocytogenes* in raw and cooked ground beef with meat processing additives.** *International Journal of Food Microbiology* 18(3); 1993; 223-232

343

Bonsell (T), Andersen (MK) and Rule (DC). **Effect of cooking oil type on final cholesterol content and fatty acid composition of ground beef.** *Journal of Food Quality* 16(5); 1993; 383-391

Pork

344

Bradford (DD), Huffman (DL), Egbert (WR) and Mikel (WB). **Potassium lactate effects on low-fat fresh pork sausage chubs during simulated retail distribution.** *Journal of Food Science* 58(6); 1993; 1245-1248, 1253

345

Cannon (JE), McKeith (FK), Martin (SE), Novakofski (J) and Carr (TR). **Acceptability and shelf-life of marinated fresh and precooked pork.** *Journal of Food Science* 58(6); 1993; 1249-1253

Pigs

346

Boles (JA), Shand (PJ), Patience (JF), McCurdy (AR) and Schaeffer (AL). **Acid base status of stress susceptible pigs affects sensory quality of loin roasts.** *Journal of Food Science* 58(6); 1993; 1254-1257

Rabbit

347

Fernandez-Espla (MD) and O'Neill (E). **Lipid oxidation in rabbit meat under different storage conditions.** *Journal of Food Science* 58(6); 1993; 1262-1264

The thiobarbituric acid reactive substances (TBARS) in raw and cooked rabbit burgers was determined and their susceptibility to oxidative rancidity and warmed-over flavour was evaluated. Mean TBARS values during refrigerated storage for burgers wrapped in polyethylene film and vacuum-packaged burgers were compared. Vacuum packaged bugers had lower ($p < 0.001$) TBARS during refrigerated storage than those wrapped in polyethylene film. TBARS values for rabbit burgers wrapped in polyethylene film were higher ($p < 0.01$) than those of chicken burgers and increased continually during storage at 4°C. TBARS values for cooked rabbit and chicken burgers at 24 h after cooking were higher ($p < 0.01$) than those for raw burgers. GS

Products

Meat

348

Zhang (M) and Mittal (GS). **Measuring tenderness of meat products by Warner Bratzler shear press.** *Journal of Food Processing Preservation* 17(5); 1993; 351-367

Tenderness of bologna, salami and pastrami was measured by Warner-Bratzler (W.B.) tests. Three samples diameters and 3 crosshead speeds were studied. The samples were ruptured under tension instead of shear; thus, shear force did not increase with the increase in sample diam. at the same cross-sectional area to applied force ratio. Crosshead speed did not affect results of bologna and salami, but affected many parameters of pastrami. Recommended test conditions are: sample diam. 20 mm at any crosshead speed for bologna; 10 to 20 mm sample diam. at any crosshead speed salami; 15 mm sample diam. and 250 mm/min crosshead speed for pastrami. AA

Ham

349

Jantawat (P), Runglerdkriangkrai (J), Thunpithayakul (C) and Sanguandeekul (R). **Effects of initial nitrite level, heating and storage on residual nitrite and spoilage of canned ham roll.** *Journal of Food Quality* 16(1); 1993; 1-11

350

Katsaras (K) and Budras (K-D). **The relationship of the microstructure of cooked ham to its properties and quality.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 229-234

This study examined the influence of salt and phosphate brine as well as tumbling and heating on the microstructure of cooked hams through scanning electron and transmission electron microscopy. The observed morphologies were used to explain mechanisms of technological, biochemical and quality characteristics of the products. AA

Poultry

Chickens

Broilers

351

Beura (CK), Johri (TS), Sadagopan (VR) and Panda (BK). **Interaction of dietary protein level on dose response relationship during aflatoxicosis in commercial broilers. I. Physical responses, livability and nutrient retention.** *Indian Journal of Poultry Science* 28(3); 1993; 170-177

The effects of interaction between dietary aflatoxin (0.0, 0.2, 0.4, 0.8 and 1.6 p.p.m.) and protein (22, 25 and 27%) levels on physical responses, livability and nutrient retention (dry matter, protein, Ca and P) in commercial broilers were studied. Each diet was given to 3 groups each having 7 chicks. Significant interactions between dietary aflatoxin and protein levels were observed in respect of body wt. gain and feed consumption. Body wt. gain, feed consumption retention of protein, Ca, P and livability at 0.8 p.p.m., while feed efficiency and retention of dry matter at 1.6 p.p.m. were adversely affected. An increase in protein level from 22 to 25 or 27% in aflatoxic diets produced a protective effect against toxicity of aflatoxin in commercial broilers. The apparent effective dose of 0.8 p.p.m. or even higher level of 1.6 p.p.m. was found to be innocuous at higher levels of protein (25 or 27%). These results suggest that dietary protein is one of the variable factors controlling the apparent effective dose of aflatoxin. AA

352

Singh (HS) and Sud (SC). **Effect of diazepam and chlorpromazinc on the growth and carcass quality of broiler.** *Indian Journal of Poultry Science* 28(3); 1993; 217-221

Growth promoting activities of two neuroleptic drugs diazepam and chlorpromazine in the broiler ratio were studied. Body wt., total feed consumption, feed efficiency ratio and wt. gain were collected at weekly interval. Both diazepam and chlorpromazine increased the body wt. gains by 24 to 152 g over the control and also improved the feed conversion ratio. Moisture and protein contents of meat did not differ significantly. Chlorpromazine significantly reduced fat %. Diazepam 0.30 mg/kg feed was the best for body wt. hot dressed wt., and ready-to-cook yield. GS

Quail

353

Panda (SK), Singh (RP) and Anand (SK). **Frozen storage stability of fried quail as influenced by polyphosphate and packaging.** *Indian Journal of Poultry Science* 28(3); 1993; 226-232

140, 5 wk old Japanese quail carcasses were battered, deep fat fried, chilled in 0 (control) or 5% sodium tripolyphosphate (STPP) sol. in the ratio of 1.2 (w/v) for 16 h at 5 plus or minus 1°C, packaged in HDPE (330°C) or LDPE (250 G) pouches, frozen (-10°C) and stored for 2 months. Deep fat frying reduced moisture content significantly from 74.2% (raw) to 59.7% (fried) with an increase in crude protein from 19.8 to 26.8% and fat from 4.9 to 10.7%. STPP in cooked meat brought about a significant increase in pH by 0.3 units, reduced shear value and inhibited lipid oxidation during storage. Wt. loss and shear values were lower in HDPE packed than in LDPE packed samples. GS

Turkeys

354

Wang (CH), Booren (AM), Abou-Zied (MM), Pestka (JJ) and Smith (DM). **ELISA determination of turkey roll endpoint temperature: Effects of formulation, storage and processing.** *Journal of Food Science* 58(6); 1993; 1258-1261, 1264

Effects of refrigerated and frozen storage, salt concn., cooking schedule and product diam. were compared on detn. of min. endpoint cooking temp. of turkey breast rolls by measuring extractable protein (EP), lactate dehydrogenase (LDH) activity and LDH concn. by sandwich enzyme-linked immunosorbent assay. LDH concn. differed in rolls processed to 70.0°C and 71.1°C, whereas EP and LDH activity did not differ at these temp. Salt concn., cooking schedule and product casing diam. did not markedly influence LDH concn. LDH content of uncooked rolls decreased during frozen storage. A max. concn. of 0.31 µg LDH/g meat indicated proper processing. AA

355

Hsieh (YLF), Fields (ML), Huff (HE) and Badding (SL). **Thermal inactivation and injury of *Clostridium sporogenes* spores during extrusion of mechanically deboned turkey mixed with white corn flour.** *Journal of Food Processing Preservation* 17(5); 1993; 391-403

An extruded mixture of mechanically deboned turkey and white corn flour was used as a model system to study the thermal inactivation and injury of *Clostridium sporogenes* spores. Thermal inactivation was observed at 93.3°C (2 log$_{10}$ reductions) and 115.6°C (4-5 log$_{10}$ reduction). Statistical analyses showed that significant difference in thermal inactivation of spores occurred between the extrusion temp. ($P < 0.05$). *C. sporogenes* spore counts of the extruded sample from a rich protein medium (Brewer Anaerobic Agar) were significantly greater than those from a limiting growth medium (Nutrient Agar) ($P < 0.05$), indicating that spores surviving severe heat treatments required nutrients not required by unheated spores. *C. sporogenes* spores counts of the extruded sample decreased after 1 and 2 wks of storage under refrigeration conditions. The overall bacteriological quality of the extruded mixture of mechanically deboned turkey and white corn flour was excellent (0 spore/g in both Brewer Anaerobic Agar and Nutrient Agar). AA

Products

Eggs

356

Dyer-Hurdon (JN) and Nnanna (IA). **Cholesterol content and functionality of**

plasma and granules fractionated from egg yolk. *Journal of Food Science* 58(6); 1993; 1277-1281

Non-spray dried (NS) and spray-dried (SD) egg yolk were fractionated into plasma (P) and granules (G) by centrifugation and the cholesterol content and the functionality of the fractions were assessed. Fractionation of NS yolk resulted in fraction yields of 25.3% NSG and 74.7% NSP. Total cholesterol values for NS samples were lowest (P less than or equal to 0.01) for NSG and highest (P less than or equal to 0.01) for NSP compared to that of NS. Fractionation of SD yielded 53.4% of SDG and 46.6% of SDP. The total cholesterol of SDP was significantly lower (P less than or equal to 0.01) than SD cholesterol. Granules from SD had the lowest percent protein and highest percent lipid values, when compared to all other spray dried products. The use of NSG as a replacement for whole yolk on a wt. basis resulted in approx. 30% reduction (P less than or equal to 0.01) in cholesterol, 46% reduction in lipid and 2 fold increase in protein. GS

357

Shukla (PK), Shrivastav (AK), Singh (RP) and Bedi (SPS). **Effect of dietary supplementation of zinc on egg production and egg quality characteristics of Japanese quail.** *Indian Journal of Poultry Science* 28(3); 1993; 190-194

The effect of dietary supplementation of graded levels of Zn (24, 50, 75 and 100 mg/kg feed) on production performance and egg quality characteristics of Japanese quail was studied. Quadruplicate groups of 6 birds each were assigned to one of the 4 experimetnal diets from 7th to 19th wk. of age. Feed consumption, egg mass, feed efficiency, hen-day egg production, egg wt., body wt., albumen index, internal quality unit and tibial bone wt., were not significantly affected by dietary Zn levels. % shell wt. was, however, significantly affected by the levels of dietary Zn and its optimum value was recorded at 50 mg/kg level of Zn. Shelf thickness increased with levels of dietary Zn with max. value at 100 mg/kg, which did not differ significantly from that of 75 mg/kg dietary level of Zn. These results suggest that dietary Zn level of 75 mg/kg is perhaps adequate for optimum production performance and egg quality of Japanese quail layers. AA

Egg powder

358

Fontana (A), Antoniazzi (F), Ciavatta (ML), Trivellone (E) and Cimino (G). **^{1}H-NMR Study of cholesterol autooxidation in egg powder and cookies exposed to adverse storage.** *Journal of Food Science* 58(6); 1993; 1286-1290

The effects of heating, diffuse daylight exposure and long-term storage on spray-dried egg powder and commercial cookies were investigated. Autoxidation was quite slow when the sample was stored in a freezer at -20°C. Diffuse day light increased the amounts of β-epoxide of cholesterol, while heating caused a sharp increase in C-7 oxidized cholesterol derivatives. Extent of cholesterol oxidation depended on storage conditions. All cholesterol oxides increased and β-epoxide was the predominant derivatives in aged samples. Only 7-ketocholesterol appeared lower with ageing. The extent and severitiy of oxidation could be reduced by proper packaging materials. GS

Egg yolk

359

Fichtali (J), Charter (EA), Lo (KV) and Nakai (S). **Purification of antibodies from industrially separated egg yolk.** *Journal of Food Science* 58(6); 1993; 1282-1285, 1290

An economical (fewer steps, low cost media, energy efficient) easy to scale-up, easily automated purification process is reported. This 3-step process purified antibodies from industrially separated egg yolk use a low cost cation exchanger within an automated liquid chromatography system. This improved the purity from 18 to about 61% and was easy to scale-up, monitor and control. Salt precipitation improved purity to about 95% and higher purities were possible. BV

SEAFOODS

360

Hudson (JA) and Mott (SJ). **Growth of *Listeria monocytogenes*, *Aeromonas hydrophila* and**

***Yersinia enterocolitica* in pate and comparison with predictive models.** *International Journal of Food Microbiology* 20(1); 1993; 1-11

In this study the growth of the *Aer. hydrophila*, *Y. enterocolitica* and *L. monocytogenes* was measured in a commercially produced pate at 4 and 10°C to represent refrigeration and mild temp. abuse conditions. The kinetic data obtained were then compared to the values predicted by response surface models in order to test the models. Strains of *L. monocytogenes* grew at both temp. The food strain of *Aer. hydrophila* grew only at 10°C, and the type of strain did not grow at either temp. Similarly, the type of *Y. enterocolitica* did not grow at either temp. and the food strain grew at both temp. The measured values of lag and generation time did not correlate with those predicted by response surface models, taken from literature and produced in the lab. Differences in predicted kinetic values from the models indicate that a model for any particular strain may not reflect the growth of naturally occuring contaminants of the same sp. SRA

Crabs

361

Chung (HY) and Cadwallader (KR). **Volatile components in blue crab (*Callinectes sapidus*) meat and processing by-product.** *Journal of Food Science* 58(6); 1993; 1203-1207, 1211

Volatile flavour profiles of fresh-picked blue crab meat and picking-table by-product were studied to assess the potential use of the by-product for flavour recovery by simultaneous steam distillation-solvent extraction/GC/MS. Among 98 compounds identified, 77 were in crab meat and 80 in by-product. 54 were new. Trimethylamine, 4 alkanes (C15-C17, C19), and indole were highest (> 50 ng/g) in crab meat, while trimethylamine, carbon disulphide, dimethyltrisulphide, two alkanes (C15 and C17), geranylacetone, and 1-dodecanol were highest in by-product. 23 compounds were higher in by-product and 7 were higher in meat. Crab processing by-product may be good source for volatile flavour recovery. GS

Oysters

362

Jones (DD), Law (R) and Bej (AK). **Detection of *Salmonella* spp. in oysters using polymerase chain reactions (PCR) and gene probes.** *Journal of Food Science* 58(6); 1993; 1191-1197, 1202

Use of the polymerase chain reaction (PCR) DNA extraction procedure saves time and increases the efficiency of the detection of *Salmonella* in oysters. The procedure which involves modification of the DNA extraction procedure followed by PCR amplification coupled with gene probe hybridization detected < 40 cells of seeded or naturally occurring *Salmonella* sp/g of oyster meat sample. GS

Squids

363

Konno (K) and Fukazawa (C). **Autolysis of squid mantle muscle protein as affected by storage conditions and inhibitors.** *Journal of Food Science* 58(6); 1993; 1198-1202

Cleavage of myosin into heavy and light meromyosin was found during the autolysis of squid mantle muscle conditions for max. autolysis were NaCl concn. 0.3 M, pH 7 and storage temp. 40°C. Storage conditions such as NaCl concn. and temp. affected both the autolysis rate and the products formed. Autolysis was inhibited by EDTA and Na-pyrophosphate at < 25°C and by phenylmethyl extracted from potato tuber at > 35°C. GS

Fish

364

Chapman (KW), Sagi (I), Hwang (KT) and Regenstein (JM). **Extra-cold storage of hake and mackerel fillets and mince.** *Journal of Food Science* 58(6); 1993; 1208-1211

Extra-cold storage (-30 and -40°C) of mackerel (*Scomber scombrus*) mince and fillets showed lower free fatty acid formation. Extra-cold storage (-30°C) of white hake (*Urophycis tenuis*) fillets produced fish with better quality based on sensory and chemical indices. The colder the storage temp., the less firm the hake mince and fillets. Ascorbic acid accelerated cohesiveness development of mackerel mince and fillets. Over time, the quality of the hake and mackerel decreased according to sensory and chemical indices. They became tougher and generally more cohesive. AA

365

Jose (VT) and Sherief (PM). **Glaze hardener: a new recruit to Indian seafood processing machinery.** *Seafood Export Journal* 25(9): 1993; 7, 9, 10

Glaze hardener is a 'mini freezer' which operates at a temp. of -25°C or below. Marine products immediately after glazing are fed into this machine, which causes the temp. to go below -20°C before packing. Glaze hardner avoids the cold storage problems like slow freezing and clumping, reduces drip loss, prevents dehydration and avoids quality deterioration. GS

366

Mackie (IM). **The effects of freezing on flesh proteins.** *Food Reviews International* 9(4): 1993; 575-610

Theories on the mechanism of protein denaturation and of the action of cryoprotectants are reviewed in this article, and the potential of using the freezing process to form textures from comminuted flesh or protein dispersions is discussed. Aspects covered are fish flesh proteins (structure of muscle, structure of myofibrils, the contractile system of the myofibrils, fish muscle proteins), postmortem biochemical changes in fish muscle, some considerations on the freezing process and frozen storage, evidence for denaturation of fish proteins on freezing and frozen storage (myofibrillar proteins, ATPase activity, sulfhydryl groups, aggregation behaviour of myosin in model systems, hydrophobicity of muscle and extractable protein, solubility of muscle in sodium dodecyl sulfate sol., sarcoplasmic proteins), factors influencing protein denaturation (physical damage caused by ice crystals, enzymic breakdown of trimethylamine oxide, lipids and their degradation products), nature of the protein denaturation process during frozen storage, stabilization of proteins against frozen storage denaturation and texture formation by freezing. 128 references. SRA

Periwinkle

367

Ariahu (CC), Adebona (MB) and Ogunsua (AO). **Quality changes in tropical periwinkle (*Tympanostomus fuscatus*) during iced storage.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 187-190

Changes in cooked flavour, appearance and mouthfeel/chewiness, tyrosine value (TV), total volatile bases (TVB), non-protein nitrogen (NPN), pH and bacterial flora were evaluated in shucked tropical periwinkle (*Tymp. fuscatus*) meat during iced storage over a period of 16 days. The periwinkle showed a decline in organoleptic quality during storage with concomitant increases in TV, TVB, pH and bacterial counts. The main bacteria isolates which were initially dominated by *Bacillus* spp. (30%) and *Staphylococci* spp. (20%) showed marked succession by *Moraxella* spp. (40%), *Flavobacterium* spp. (25%) and *Pseudomonas* spp. (20%) during spoilage. The shelf-life limit for the shellfish was 6 to 8 days. AA

Salmon

368

Bhattacharya (S), Choudhury (GS) and Studebaker (S). **Hydrothermal processing of pacific chum salmon. Effects on texture and *in vitro* digestibility.** *Journal of Food Quality* 16(4); 1993; 243-251

Texture profile analysis by Instron of Pacific chum salmon (*Oncorhynchus keta*) muscle subjected to hydrothermal treatment (60 - 100°C) for 0 - 40 min showed higher hardness, cohesiveness, springiness (elasticity) and chewiness values than the raw muscle. Prolonged heating at higher temp. (90 - 100°C) softened the muscle as indicated by decreased texture profile values except cohesiveness. *In vitro* digestibility of heat treated muscle was not different from that of raw muscle. SD

Tuna

369
Banga (JR), Alonso (AA), Gallardo (JM) and Perez-Martin (RI). **Kinetics of thermal degradation of thiamine and surface colour in canned tuna.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 127-131

The kinetics of thermal degradation of thiamine and surface colour (lightness measured as Hunter L-value) in canned white tuna were determined using an unsteady-state experimental procedure. Kinetic parameters were calculated by weighted non-linear regression considering a first-order kinetic model with a dependence of the kinetic coefficient (D) with temp. of the Thermal Death Time (TDT) type. Mass-average retentions of thiamine were calculated using a mathematical model which takes into account the non-uniform and unsteady distribution of temp. inside the container during thermal processing. The high correlation obtained between the predicted and the observed retention values and the small confidence intervals found for the kinetic parameters indicate a high statistical reliability. The kinetic model thus determined permits the simulation and optimization of the process resulting in a better quality of the final product. AA

White fish

370
Hattula (T), Kiesvaara (M) and Moran (M). **Freshness evaluation in European whitefish (*Coregonus wartmanni*) during chill storage.** *Journal of Food Science* 58(6); 1993; 1212-1215, 1236

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

371
Patzold (R), Fenz (R), Krause (M) and Galensa (R). **Screening method for the detection of maize in beer.** *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 390-391 (De)

A HPLC-method is described, which allows a quick decision about the use of maize as a maltsurrogate in brewing process. Indicator is 1-O-*trans*-p-Coumaroylglycerol. For clean up, a double step solid phase extraction with RP-18- and ion exchange-cartridges is used. The HPLC separation is carried out with β-Cyclodextrin columns. AA

Wines

372
Hupf (H) and Jugel (H). **Biogenic amines in wine - experiences regarding consumer protection.** *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 382-387 (De)

A review is given about consumer complaints submitted to the Official food control organisation for Southern Bavaria. Health disturbances that supposedly occurred after the drinking of wine are reported. The types of health disturbances are discussed as to their occurrence in white and red wines as well as in domestic wines and wines of foreign origin. In consequence it becomes evident - contrary to the scientific discussion on biogenic amines - that the socalled hangover symptoms occured mainly after the drinking of white wines. 71 wines from 10 different countries not belonging to the European Community, mainly from South-Eastern Europe were examined for their content of all in all 9 biogenic amines. It is true that red wine shows the highest amine concn., but median values of histamine content are about equal in white and red wines. The wines held responsible for health disturbances did not show significantly high levels of biogenic amines. AA

Non-alcoholic beverages

Soy beverages

373

Anantha Narayanan (KR), Abhay (Kumar) and Patil (GR). **Kinetics of various deteriorative changes during storage of UHT soy beverage and development of a shelf-life prediction model.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 191-197

The shelf-life of UHT (ultra-high temp.) soy beverage stored at 5, 25, 35 and 45°C was determined. Various physicochemical and sensory changes in soy beverage were monitored during storage. The viscosity, proteolysis, lipolysis, oxidation and browning were found to increase and pH, reflectance and sensory scores found to decrease during storage. These changes could be described well with first-order reaction kinetics. The rates of these reactions were found to be highly temp.-dependent, the rates being higher at high temp. The activation energy and other activation parameters such as activation enthalpy, activation entropy and free energy of activation for these reactions were determined. The interrelationships between sensory and physicochemical changes were established. The proteolytic changes (measured in terms of trinitrobenzene sulfonic acid value) alone could explain 97 and 98% variation in flavour and total score of the beverage, respectively. The shelf-life prediction model, based on the kinetic constants and the relationshio between sensory and chemical parameters, was developed. AA

Tea

374

Chaudhuri (TC). **Grading and nomenclature of tea.** *Packaging India* 26(4); 1993; 25-26

Grading of tea by taste, dry leaf texture, aroma (dry leaf aroma, infused aroma, liquor aroma), colour (dry leaf colour, infused leaf colour, liquor colour), dry leaf appearance, buyer's reference, general terms, approved grades (orthodox tea, CTC tea, green tea) and future concept of grading tea are dealt in this article. CSA

FATS AND OILS

375

Yanishlieva (NVI) and Kortenska (VD). **On the participation of fatty alcohols in inhibited oxidation of lipids.** *Lebensmittel-Wissenschaft und - Technologie* 95(1); 1993; 35-40

The effect of 1-tetradecanol and 1-octadecanol in concn. of $(0.5 - 9.0).10^{-2}$ mol/l on the hydroquinone $(1.10^{-4}$ mol/l)-inhibited oxidation of the triacylglycerols of sunflower and olive oils at 80 and 110°C has been investigated along with the role of temp. changes within the range 23-100°C. It is established that fatty alcohols accelerate the inhibited oxidation of lipids by participating in (1) the blocking of the phenolic antioxidant through the formation of a hydrogen bond-based complex and (2) the proceeding of additional reactions such as chain propagation, chain branching chain termination. The alcohol with a shorter chain length leads to the formation of a complex where the bond with the inhibitor is stronger whereas the alcohol with a longer chain length exhibits a higher activity in the elementary reactions of propagation, branching and termination of chains. The type of the lipid substrate is found to cause no qualitative change of the effect of alcohols. It is established that with increasing unsaturation (oxidizability) degree of the lipid substrate the effect of fatty alcohols on the inhibitor efficiency and the rate of inhibiting oxidation increase. The change of temp. has a specific effect on the contribution of the two alcohols to the decrease of the inhibitor efficiency and the increase in the rate of the inhibited process. AA

Fats

376

Behr (VA), Doring (N), Durowicz-Heil (S), Ellenberg (B), Kozik (C), Lohr (Ch), Schmidke (H). **Selective hydrogenation of multi-unsaturated fatty acids in the liquid phase.** *Lebensmittel-Wissenschaft und - Technologie* 95(1); 1993; 2-12 (De)

Fatty acids and esters which contain only one double bond have interesting properties such as high oxidation stability or favourable pour points. For these reasons such products find a broad field of application for instance in the sections cosmetics, textile finishing agents or oilfield chemicals. However, natural fats and oils contain often multi-unsaturated fatty acids such as linoleic and linolenic acid which are able - even in minor amounts - to change substantially the physical and chemical properties of the fatty material. Therefore, a hydrogenation procedure is needed which enables the selective conversion of multi-unsaturated into mono-unsaturated fatty acids without formation of completely saturated compounds. After a review of the general possibilities in selective hydrogenation a new method is described to hydrogenate with solvent-stabilized palladium colloid catalysts. A remarkable high selectivity was obtained applying very mild reaction conditions. By use of the liquid-liquid two phase technique an easy and complete catalyst recycle is possible. AA

Oils

377

Phifer (DWJr) and Costello (CA). **Relationship between oil absorption and microstructure of calendered and non-calendered polyster and polypropylene melt blown material.** *Journal of Food Quality* 16(1); 1993; 25-33

Absorption of coconut and safflower oils was studied using scanning electron microscopy. Non calendered polypropylene (NC-PP 635%) and noncalendered polyester consistently absorbed more oil than calendered polypropylene (366%). Smaller average fibre diam. and greater material thickness provided a significantly larger surface area for the NC-PP material. The same combined with larger interfibre spacing increased oil absorption by NC-PP material. SD

378

Neff (WE), Adolf (RO), Konishi (H) and Weisleder (D). **High performance liquid chromatography of the triaglycerols of *Vernonia galamensis* and *Crepis alpina* seed oils.** *Journal of the American Oil Chemist's Society* 70(5); 1993; 449-455

The *Vernonia galamensis* oil contained 50% trivernoloyl and 21% diveinoloyllinoleoyl glycerol along with 20% triacylglycerols with one verolic and two other fatty acids. The *Crepis alpina* oil contained 36% tricrepenynoyl and 33% dicrepenynoyllinoleoyl glycerols, 17% triacylglycerols with two crepenynic and one other fatty acid. GS

379

Tang (VL), Bayer (E) and Zhuang (R). **Obtain, properties and utilization of Chinese teaseed oil.** *FAT Science Technology* 95(1); 1993; 23-27 (De)

China is the greatest producer of teaseed oil. Chinese teaseed oil is obtained principally from *Camellia oleifera*, which grows widely in 17 provinces of South-China, rather than from *Camellia sasanqua* or *Camellia sinensis*, which is cultivated for tea. The teaseed oil production in China over the last 5 yrs was about 150,000tons per annum, and was obtained almost exclusively by pressing. The chemical and physical characteristics of Chinese teaseed oil are nearly identical with those of olive oil. Its principal use in China is as an edible oil. After catalytic hydrogenation however it may be used for the production of a cocoabutter substitute. AA

Canola oil

380

Przybylski (R), Malcolmson (LJ), Eskin (NAM), Durance-Tod (S), Mickle (J), Carr (R). **Stability of low linolenic acid canola oil to accelerated storage at 60°C.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 205-209

A crude commercial canola oil (Westar) and an oil obtained from a genetically reduced linolenic acid cv., were lab. processed under commercial conditions to finished, deodorized oils. Fatty acid analysis indicated that the linolenic acid content of the low linolenic canola oil (LLCO) was 3.1%, compared to 11.5% for Westar. The LLCO exhibited markedly improved stability during accelerated storage at 60°C (Schaal Oven Test) as evident by negligible changes in chemical indices of rancidity. No significant changes were observed in overall odour intensity or odour pleasantness for the LLCO over the 12 days storage period, whereas significant changes were found for the Westar oil. Comparison of volatiles produced by these oils during storage confirmed enhanced storage stability of LLCO. AA

SPICES AND CONDIMENTS

Essential oils

Lemon oils

381

Braunsdorf (R), Hener (U), Stein (S) and Mosandl (A). **Comprehensive CGC-IRMS analysis in the authenticity control of flavours and essential oils.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 137-141

The $\delta^{13}C_{PDB}$) values of 9 flavour compounds from 5 different lemon oils were determined using GC-isotope ratio mass spectrometry. By definition of a suitable internal isotopic standard (i-IST), the influence of CO_2 fixation during photosynthesis is eliminated. The isotopic effects among genuine monoterpenes are, therefore, limited to the influence of enzymatic reactions during secondary biogenic pathways. Calculating versus nerylacetate as an i-IST yields fruit-specific $\delta^{13}C$ values for neral and geranial with low standard deviation and seems to be suitable for authenticity control of lemon oils. AA

Spices

Capsicum

382

Yuen (CMC) and Hoffman (H). **New capsicum varieties: Storage suitability and consumer preference.** *Food Australia* 45(4); 1993; 184-187

This paper reports a field and storage trials in 45 new *capsicum* var. and a survey of Western Australian consumers' attitude to *capsicum* quality, size, shape and colour and usage. The storage life of *capsicum* var. had marketable post-harvest life of about 17 days when stored at 8.5°C. Most consumers liked small-to-medium, flat, round crisp, blemish free red capsicums. Only 40% of consumers surveyed indicated that the quality of *capsicum* available was good. About half were prepared to pay a higher price for better quality *capsicums*. *Capsicums* were used for salads and cooking. SRA

Chillies

383

Veeresham (C), Kokate (CK), Venkateswarlu (V) and Ramesh Babu (B). **Influence of DL-dopa and L-tyrosine on bioproduction of capsaicin in callus cultures of *Capsicum annuum* Linn.** *Indian Journal of Experimental Biology* 32(3); 1994; 223-224

Callus cultures of *C. annuum* initiated from hypocotyl proteins of seedlings, maintained on modified MS medium, were sub-cultured onto the same medium supplemented with 50 mg/l each of DL-dopa and L-tyrosine. After 4 wk, the biomass and medium extracted for capsaicin and analysed showed an appreciable change in capsaicin in content due to supplementation of DL-dopa (0.173% mg) and L-tyrosine (0.33% mg) over the control cultures (0.033% mg), was recorded only in the medium indicating its extracellular in vitro accumulation. AA

Coriander

384

Thies (W). **Determination of the petroselinic acid content in seeds of *Coriandrum sativum* by gas liquid chromatography.** *Lebensmittel-Wissenschaft und - Technologie* 95(1); 1993; 20-23

With dimethylsulphide the methylthio-derivatives of unsaturated fatty acid methylesters are readily formed within 30 min at 70°C. Whereas the analysis of oleic and petroselinic acid methyl esters by GLC is very time consuming (separation time: 1 h), their corresponding methylthio-derivatives can be quantitatively determined within 14 min. AA

Cumin

385

Guptha (BM). **Residues of monocrotophos in/on cumin.** *Indian Cocoa, Arecanut - Spices Journal* 16(2); 1992; 57-59

Initial residue of monocrotophos in/on cumin leaves were 5.74 and 8.31 p.p.m. whereas in the whole plants it was 7.68 and 10.47 p.p.m. at 0.04 and 0.06% concn. respectively. Residues reached at safe level and below the detectable level in about 14 and 17 days respectively at both the concn. No residues were detected in the green and dry grains. AA

Ginger

386

Kikuzaki (H) and Nakatani (N). **Antioxidant effects of some ginger constituents.** *Journal of Food Science* 58(6); 1993; 1407-1410

The nonvolatile fraction of the dichloromethane extract of ginger rhizomes exhibited a strong antioxidative activity using linoleic acid as the substrate in ethanol-phosphate buffer sol. The fraction was purified by chromatographic techniques to provide 5 gingerol related compounds and 8 dairylheptanoids. Among them, 12 compounds exhibited higher activity than α-tocopherol. The activity was probably dependent upon side chain structures and substitution patterns on the benzene ring. AA

Pepper

387

Shaji James (P) and Mary Regina (F). **Sun drying characteristics of pepper.** *Indian Cocoa, Arecanut - Spices Journal* 16(2); 1992; 44-46

Karimunda and Panniur - I, two pepper (*Piper nigrum* L.) var. from Kerala, India were subjected to both sun drying and CFTRI method of drying after dipping the fresh berries in boiling water for 1 min. The samples were spread for drying on concrete floor, tarpauline sheets and bamboo mats. Berries lost moisture more quickly in initial stages and during exposure periods. Moisture loss did not occur after 26 h of exposure to sun. % of extranceous matter was max. in berries dried on bamboo mats. CFTRI method of drying imparted a good colour to the product. GS

SENSORY EVALUATION

388

Ketelsen (SM), Keay (CL) and Wiet (SG). **Time-intensity parameters of selected carbohydrate and high potency sweeteners.** *Journal of Food Science* 58(6); 1993; 1418-1421

Time-intensity (TI) sweetness curves were generated and ten TI parameters were determined for selected carbohydrate and high potency sweetners. Samples were evaluated by trained panelists at 5% sucrose equivalency (SEV) in water for sucralose, sucrose, fructose, aspartame, cyclamate, acesulfame-K and saccharin and at 9% SEV in water and a buffered model beverage system for sucralose, sucrose, fructose, aspartame and cyclamate. When compared within each system, differences in temporal properties appeared to be concn. and media dependent. No differences in onset characteristics were observed among equisweet groups. Aftertaste characteristics differed among sweeteners only at 9% SEV in water where high potency sweeteners tended to have somewhat longer after taste than nutritive sweeteners. AA

389

Warmke (R) and Belitz (H-D). **Influence of glutamic acid on the bitter taste of various compounds.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 132-133

The bitter taste of L-valine, L-tryptophan, L-trileucine and a tryptic hydrolysate or α_{s1}-casein was diminished to 17-35% of its original strength by glutamic acid in a molar excess between 0.6 and 14. The bitter taste of compounds from other structural classes was not (naringin, limonin) or not seriously affected by glutamic acid. The maximal effects were decreases in bitterness to 77% (caffeine) and 71% (quinine) of the original value, respectively. The results indicate the existence of various bitter receptors. AA

390

Lawless (HT) and Claassen (MR). **Application of the central dogma in sensory evaluation.** *Food Technology* 47(6); 1993; 139-146

The article suggests that matching test objectives with proper methods, appropriate panelists, appropriate statistical hypotheses and analyses of data will enhance the usefulness of sensory data. CSA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

391

Weidenborner (M) and Jha (HC). **Antifungal activity of flavonoids and their mixtures against different fungi occurring on grain.** *Pesticide Science* 38(4); 1993; 347-351

Flavone and flavonone showed higher antifungal activity than the hydroxylated flavours on four fungi (*Alternaria alternata*, *Cladosporium herbarum*, *Fusarium oxysporum* and *Trichoderma harzianum*) found in grain. Mixtures containing flavone and 7-hydroxyflavone or flavone, flavanone and flavanol caused higher inhibition of fungal growth than the remaining ones. BV

BIOCHEMISTRY AND NUTRITION

392

Zollner (N). **Familial hypercholesterolemia: 40 years research on this disease.** *Lebensmittel-Wissenschaft und - Technologie* 95(1); 1993; 12-18

393

Cheftel (JC) and Dumay (E). **Microcoagulation of proteins for development of "creaminess".** *Food Reviews International* 9(4); 1993; 473-502

Aspects covered in this article are synthetic or semi-synthetic compounds containing fatty acids, polysaccharide or protein-based products. Commercially available carbohydrate and protein-based fat replacers, preparation and characteristics of protein-based fat replacers (native protein microparticles, formation of protein-polysaccharide complexes, controlled protein precipitation, microcoagulation through thermomechanical processes). 38 references. SRA

394

Agulilera (JM) and Stanley (DW). **The microstructure of food protein assemblies.** *Food Reviews International* 9(4); 1994; 527-550

This paper focusses on the microstructural aspects of some protein assemblies and their relation to processing and functionality. Aspects covered include: disassembly of protein bodies in seeds during aqueous extraction, freeze-texturization and gelation of muscle proteins, formation of large protein aggregates during caking of fish hydrolysate powders, transformation of globular to fibrous aggregates and the role of T_g during extrusion cooking, formation of mixed and filled dairy gels, and kinetics of aggregation of β-lactoglobulin. 64 references. SRA

395

Anantharaman (K) and Finot (PA). **Nutritional aspects of food proteins in relation to technology.** *Food Reviews International* 9(4); 1993; 629-655

This report highlight aspects like proteins and amino acids in nutrition (protein and amino acid requirements, protein and amino acids in foods), protein sources for food applications (new protein foods; potential, some technological successes, new protein resources: their chance of success, some successful product developments, enzymatically modified proteins, chemically modified proteins with desirable functional properties, peptides for intravenous nutrition), influence of technology on protein quality (effects of processing, extrusion cooking, lysine blockage and lysinoalanine formation in milk, instant infant cereals, protein/polyphenol interactions, microwave processing), biochemical effects (proteins as a main component of the diet and minor protein constituents. 61 references. SRA

396

Kitabatake (N) and Doi (E). **Improvement of protein gel by physical and enzymatic treatment.** *Food Reviews International* 9(4); 1993; 445-471

The possibilities of the use of enzymes for food processing are discussed. Heat treatment (ovalbumin, egg white, other food proteins, melting of the heat-induced ovalbumin gel), enzymatic treatment of food protein (proteolytic enzyme-limited proteolysis by pepsin at pH 4, transglutaminase, other enzymes: phosphatase, glycosidase, and aldehydrogenase) are the aspects covered. 40 references. SRA

TOXICOLOGY

397

Hemmen (F), Paraf (A) and Smith-Gill (S). **Lysozymes in eggs and plasma from chicken, duck and goose: Choice and use of mAbs to detect adulterants in "Foie Gras".** *Journal of Food Science* 58(6); 1993; 1291-1293, 1299

Lysozymes from either egg-white or plasma were found to be different by monoclonal antibodies (mAbs). For improving texture of "foie gras" or for economical reasons adulterants such as fresh livers from chicken or turkey or hen egg-white have been used. Duck or goose "foie gras" were not detected by anti-duck lysozyme mAbs, while positive reactions were obtained with anti-hen-egg-white lysozyme (HEWL). Similarly, anti-HEWL mAbs detected chicken or turkey fresh liver in duck or goose "foie gras" even after heating at 80°C. In 110°C-heated "foie gras" only mAbs HyHEL (hybridoma antihen-egg-white lysozyme) 5 and HyHEL 10 were effective to detect fresh hen livers. AA

398

Hansen (TJ). **Quantitative testing for mycotoxins.** *Cereal Foods World* 38(5); 1993; 346, 348

The author describes how information obtained by rapid quantitative testing can aid decision making in mycotoxin management. Levels for some specific mycotoxins (aflatoxin, fumonisin, ochratoxin, and zearalenone) which are important for regulatory or toxicology reasons are also detailed in this article. CSA

399

Romer (T) and Maune (C). **A practical approach to mycotoxin quality control.** *Cereal Foods World* 38(5); 1993; 349-350, 352

The quality control tool designed to enable users to minimize problems caused by mycotoxins and the importance of proper sampling and testing procedures are described in this article. CSA

400

Frommberger (R). **Intake of dioxins and furans via paper products intended for direct food contact.** *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 375-381 (De)

Sixteen paper samples meant for direct contact with foods were analysed for the content of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). In all of the samples PCDDs/PCDFs were present in a range from 0.08 ng/kg FHO (Berlin) toxic equivalents (TE) to 7.66 ng/kg TE. Expressed in I-TE, the range was 0.04 to 6.53 ng/kg. Calculated on a surface basis, the contents ranged from 0.03 to 3.94 ng/dm^2 FHO-TE, or expressed in I-TE, from 0.02 to 3.38 ng/dm^2. According to these data combined with the estimation of the contact surface of these papers with foods, the estimation of the transfer rate of PCDDs/PCDFs into different foods and the known intake of the foods having contact with these paper products, an attempt was made to estimate the contribution of these paper products to the total intake of PCDDs/PCDFs. According to this study, this contribution may be rather different due to the great differences in PCDD/PCDF content of the paper products, but should not exceed 5% of the total intake. AA

401

Rangaswamy (JR). **Effect of physical attributes of robusta coffee on phosphine residue.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 210-214

Lower grade Robusta coffee (bulk 63) with broken and holed beans having dark rough surfaced husks, have a higher phosphine (PH_3) residue (0.1820 mg/kg) compared to higher grade beans (bulks 41, 48 and 54). The computed phosphine residue in pre-aired (0.1541 mg/kg) and 1 d aired (0.0675 mg/kg) samples of bulk 63 was less than the corresponding determinable free PH_3 residues (0.1820 and 0.1530 mg/kg respectively), while the computed PH_3 residue in pre-aired beans of bulks 41 (0.1571 mg/kg), 48 (0.1561 mg/kg) and 54 (0.1635 mg/kg) was more than the corresponding determinable free PH_3 residue (0.0718, 0.0992 and 0.0774 mg/kg respectively). Both pre-aired and 1 d aired samples of bulk 63 attained zero-residue level at 24 d compared to 27 to 33 d by those of bulks 41, 48 and 54, indicating that low grade Robusta coffee beans did not only adsorb large amounts of PH_3 during fumigation but also desorbed faster during storage. Physical attributes had affected the level of free PH_3 residue only. Slightly more inorganic phosphorus residue was found in the beans of bulk 63 compared to that in the other three bulks. AA

FOOD LAWS AND REGULATIONS

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402

Phillip (J), Nair (GS), Premalatha and Sudhadevi (PK). **Effect of planting materials and time of harvest on yield and essential oil content of rhizomes in *Acorus calamus*.** *Indian Cocoa, Arecanut - Spices Journal* 16(2); 1992; 63-65

Time of harvest and the planting materials significantly influenced the drying % and the essential oil content of the rhizome (*Acorus calamus*). Drying % of the rhizomes increased while the essential oil content decreased with maturity of crops. Use of rhizome bits of 6 cm length with growing tops and leaves as planting material and harvesting the crops and leaves as planting material and harvesting the crops 10 months after planting were found optimum of max. yield of essential oil. GS

403

Singh (C), Poonia (GS) and Toor (MS). **Distribution pattern of fruit processing industry in Punjab.** *Indian Food Packer* 48(1); 1994; 47-52

District-wise fruits production and processing capacity of fruit processing units in Punjab State, India, were compared. Location of the fruit processing units was found to be more concentrated in areas and districts where production of fruits was low. A ready market for the processed products, financial and transportation facilities were found to be significant. The need for extension of fruit processing industry in the state and to evolve a rational policy with respect to location, size and expansion of processing plants were recognised. GS

404

Gupta (RK). **New project opportunities in food processing industry.** *Beverage and Food World* 20(5); 1993; 8-9

This article briefly describes a range of new project opportunities in food processing industry for domestic and international market. Covers spice oils and oleoresins, mushroom cultivation and processing, asparagus cultivation and canning, roasted and salted peanuts, potato powder and dehydrated onions. SRA

405

Peleg (M). **Fractals and foods.** *CRC Critical Reviews in Food Science and Nutrition* 33(2); 1993; 149-165

This reveiw surveys, past food applications of fractal geometry and point to other potential uses of the concept in food science and technology. Aspects included are integer and noninteger dimensions, fractal foods, true and apparent fractal dimensions, the jaggedness of lines (fractal dimension and tortuosity, particle silhouttes, the ruggedess of the stress-strain relationships of brittle/crunchy materials), surface area and texture (interpretation or sorption data, interpretation of photographs and micrographs), fractal aggregates, related disciplines and methods (nonlinear processes and deterministic chaos, fractal interpolation, the fourier transform, image processing, symmetrized dot pattern), future trends in food research. 40 references. SRA

406

Sloan (AE). **Consumers, the environment and the food industry.** *Food Technology* 47(8); 1993; 72, 74-75

Consumers' interest and actions regarding environmental issues such as recycling, overpackaging and solid waste is discussed in this article. CSA

407

Fuller (GW). **Ingredients and "green" labels.** *Food Technology* 47(8); 1993; 68-71

This article attempts to focus on some of the issues and on a variety of ingredients, including fat replacers, sweeteners, sugars, fiber ingredients, protein, antioxidants, antimicrobial agents and colorants which developers may be able to use in reformulating products to become greener. CSA

FOOD PROCESSING

408

Khodke (S), Shaikh (AF), Kurhadkar (VC) and Khodke (UM). **Effect of soaking time interval in hot and cold water on dal milling.** *Indian Miller* 24(4); 1994; 27-32

The effect of cold water and hot water soaking on dal recovery, % dal recovery by traditional method and improved premilling techniques were assessed. In traditional method pigeon pea sample was soaked in water for 10-12 h, steeped for 5-10 min and sun-dried for one day. In cold water soaking method pigeon pea was soaked in cold water at 30°C at the interval of 2, 4, 6, 10, 12 and 14 h. After soaking steeping was done and one set of sample was sun-dried and other set oven dried at 65-70°C upto 10-11% moisture content. In hot water soaking the sample was soaked in hot water at 40, 50, 60 and 70°C at the interval of 10, 20, 30, 40 and 50 min. The dal recovery in traditional premilling treatment was 63.7% which was the least among all other premilling methods. The sun drying was found to be better than oven drying. The max. recovery of dal was 71.73% at 4 h cold water soaking and sun drying method. In hot water treatment, the max. dal recovery of 77.57% was found at 70°C for 2 min soaking period. SRA

409

Mukherjee (S). **Opportunities of enterpreneurship in small scale food processing in North East and Eastern Region.** *Indian Food Packer* 47(6); 1993; 17-21

Statewise production figures of fruits and vegetables in India, and low cost technology for effecting preservation - fermentative method of preservation of vegetables; dehydration combining all kinds of driers coupled with sundrying; and bottling of fruits, pulps and juices are presented. GS

410

Shahidi (F) and Xiao-Qing (H). **Encapsulation of food ingredients.** *CRC Critical Reviews in Food Science and Nutrition* 33(6); 1993; 501-547

This paper reviews techniques for preparation of microencapsulated food ingredients and choices of coating material. Characterization of microcapsules, mechanisms of controlled release, and efficiency of protection/stabilization of encapsulated food ingredients are also presented. 239 references. SRA

FOOD PACKAGING

411

Anon. **Packaging for fresh fruits and vegetables.** *Beverage and Food World* 20(5); 1993; 24, 25

Article briefly describes the following cost, dimensions, distribution, norms and preferences, shelf-life, micro-climate, quality at destination, box specification, construction and graphic design and labelling. SRA

412

McNeal (TP) and Hollifield (HC). **Determination of volatile chemicals released from microwave-heat-sesceptor food packaging.** *Journal of AOAC International* 76(6); 1993; 1268-1275

Microwave heat susceptors that convert electromagnetic energy to heat attain high temp. that make it possible to cook some foods to golden crispness in a microwave oven. Sesceptors are typically packaged with foods intended for microwave use, e.g., waffles, pizzas and french fries. The high temp. > 302°F used to cook some foods release trace levels of volatile chemicals from metalized polyester film, adhesive, and paper packaging materials; these volatile chemicals may be absorbed by the food. Microwave simulated susceptor cooking conditions were and developed protocols by using headspace concn. capillary GC and MS to identify volatile chemicals released from heated susceptors. A limited, cross-sectional sample of local retail microwave food products packaged with susceptors and protocol to analyze 10 different susceptor products. Although more than 140 unique chromatgraphic peaks were tabulated, only 44 volatile chemicals were identified, including

1,1,1-trichloroethane, benzene, and 2-(2-butoxyethoxy)ethanol, which were derived primarily from the paper and adhesive susceptor components. No one susceptor contained all the identified substances. The standard additions technique was the preferred method for quantitation. Trichloroethane and 2-(2-butoxyethyoxy)ethanol were present in several products at 75-122 μg/in.^{2} of susceptor surface area. Benzene was found in 3 susceptors at less than or equal to 0.22 μg/in.^{2} levels. Examination indicated that adhesives used in more recent susceptor products were formulated to remove even this trace level of benzene. AA

413

Giese (J). **Packaging, storage and delivery of ingredients.** *Food Technology* 47(8); 1993; 54-58, 60, 62, 63

Selection, storage and delivery techniques for obtaining the optimum in ingredient functionality is discussed in this article. Aspects covered are purchasing, storage and handling of spices, colour conservation (colours exempt from certification, certified colours, colour delivery), selection, storage, dispersion and agglomeration of gums, vital nutrients, micro and edible packages (microencapsulation, gelation encapsulation and edible films). CSA

414

Begley (TH) and Hollified (HC). **Recycled polymers in food packaging: Migration considerations.** *Food Technology* 47(11); 1993; 109-112

Possibility of migration of toxic contaminants into food associated with the use of recycled polymer for food packaging is described in this article. CSA

FOOD ENGINEERING AND EQUIPMENT

415

Ramesh (A). **Engineering the food sector.** *Beverage and Food World* 20(5); 1993; 7, 11

The infrastructural facilities available at CFTRI are briefly highlighted in this article. Covers: pilot plants, fabrication workshop, design section, engineering activities (process scaled up, equipment development), and food engineering centre. SRA

416

Isse (MG), Schuchmann (H) and Schubert (H). **Divided sorption isotherm concept: An alternative way to describe sorption isotherm data.** *Journal of Food Process Engineering* 16(2); 1993; 147-157

The broad range of moisture sorption isotherm (MSI) data of mango is divided into 2 ranges of submoisture sorption isotherms (sub-MSI), corresponding to two different ranges of a_w; the net isosteric heat of sorption (q_{st}) is used as subdivision criterion of these two ranges. The sub-MSI are fitted to a general equation. The mean error is 5% for the first sub-MSI (q_{st}) and 10% for the second (q_{st} less than or equal to 0). AA

417

Singh (AK) and Thorpe (GR). **A grid generation technique for numerical modelling heat and moisture movement in peaked bulks of grain.** *Journal of Food Process Engineering* 16(2); 1993; 127-145

This paper describes a numerical solution procedure to study heat and moisture transfer processes by two-dimensional and natural convection phenomena in grain stores with arbitary geometrics. This enables grain storage technologists to investigate the design and performance of grain stores in which the grain surface is peaked, as in bunker storage, for example, momentum transfer is described by an elliptic partial differential equation, which governs the behaviour of the stream function. Using an algebric grid generation technique, the governing equations are transformed into a body-fitted rectangular coordinate system that allows coincidence of all boundary lines with a coordinate line. Numerical solutions of the resulting equations are obtained using an alternating direction implicit method. Results from numerical experiments on a peaked bulk of stored grain retained between two vertical walls .are obtained that show the magnitude and directions of convection currents and contours of temp., moisture, dry matter loss and chemical pesticide concn. AA

418

Tamura (MS), Henderson (JM), Powell (RL) and Shoemaker (CF). **Analysis of the helical screw rheometer for fluid food.** *Journal of Food Process Engineering* 16(2); 1993; 93-126

The Helical Screw Rheometer (HSR) is being evaluated for rheological measurements of fluid food suspensions. The HSR consists of a helical screw enclosed in a tight fitting cylinder. With a closed system the inner screw is rotated creating a linearly increasing pressure differential along the axis of the screw, which is proportional to the viscosity of the fluid. This paper present theoretical one- and two-dimensional flow analyses for Newtonian fluids using both rectangular and cylindrical coordinates. For non-Newtonian fluids a one-dimensional rectangular analysis was developed using the power law model. AA

419

Noronha (J), Hendrickx (M), Suys (J) and Tobback (P). **Optimization of surface quality retention during the thermal processing of conduction heated foods using variable temperature retort profiles.** *Journal of Food Processing Preservation* 17(2); 1993; 75-91

Optimal variable retort temp. profiles (VRT) for the sterilization of conduction heated foods were calculated using a quasi-Newton multivariable optimization algorithm considering both the maximization of surface quality and the minimization of total process time. When the maximization of surface quality was the objective, an increase up to 20% in quality retention was predicted for optimal VRT profiles as compared to optimal constant retort temp. profiles (CRT). When considering the minimization of total process time, the use of VRT profiles allowed reduction in the total process time of up to 45% while still providing the same surface quality as optimal CFT. Since the results could not be generalized, it was concluded that optimal VRT profiles should be calculated on a case-by-case basis. AA

420

Tong (CH) and Lentz (RR). **Dielectric properties of bentonite pastes as a function of temperature.** *Journal of Food Processing Preservation* 17(2); 1993; 139-145

Dielectric properties [dielectric constant (ε') and loss factor (ε")] of 8% and 10% (w/v) bentonite pastes at 2450 MHz were measured from -25°C to 90°C by the cavity perturbation technique. The dielectric constant decreased as moisture content decreased and temp. increased (temp. less than or equal to 0°C). The relationships between loss factor, moisture content and temp. were not straight forward due to the ionic loss (d.c. conductivity). Because of the similarities between bentonite pastes and most food materials in dielectric constant, loss factor, and penetration depth, bentonite pastes can be good model food systems to study microwave heating. AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

421

Sapers (GM). **Browning of foods: Control by sulphites, antioxdants and other means.** *Food Technology* 47(10); 1993; 75-84

The article reviews the essential differences between enzymatic and nonenzymatic browning that are pertinent to control of discolorations, survey the current state of the art with regard to browning inhibitors (sulphites, ascorbic acid-based formulations, polyphenol oxidase inhibitors, complexing agents, sulphydryl - containing amino acids) and examines the outlook for new approaches and improvements in control of browning. The article also focusses on the problem of controlling enzymatic browning in fruits, vegetables and shellfish. CSA

422

Zlatanos (SN) and Sagredos (AN). **Glycidyl esters of phthalic acid as plasticizers and stabilizers for PVC.** *FAT Science Technology* 95(8); 1993; 308-312

Mono- and di-glycidyl esters of phthalic acid were tested as plasticizers and stabilizers for PVC. These were compared with commercial products, such as dibutylphthalate, di-2-ethylhexyl-phthalate, epoxydized soyabean oil and glycerine monooleate. The glycidyl esters of mono-alkylphthalates exhibited, at lower temp. levels, a better solubility for PVC than di-2-ethylhexyl-phthalate. n-Octyl- and 2-ethylhexyl-glycidyl-phthalate are better than di-2-ethylhexyl-phthalate w.r.t. plasticizing and gelatinizing characteristics. Mixture of PVC with either of the two glycidyl esters exhibited also higher thermal stability than di-ethylhexyl-phthalate-PVC-mixture. n-Octyl- and 2-ethylhexyl-glycidyl-phthalate are comparable with glycerinmonooleate as PVC-co-stabilizer. However, they are as stabilizers inferior to epoxydized soyabean oil. The glycidyl esters exhibit a higher volatility compared to diisooctyl-phthalate, whereas, this is in the case of dibutylphthalate lower. Diglycidylphthalate is in contrast to alkylglycidylphthalates unstable above 130°C so that it is not suitable as PVC-plastizicer. AA

423

Gee (JM), Price (KR), Ridout (CL), Wortley (GM), Hurrell (RF), Johnson (IT). **Saponins of quinoa (*Chenopodium quinoa*): Effects of processing on their abundance in quinoa products and their biological effects on intestinal mucosal tissue.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 201-209

In vitro and *in vivo* studies in rat indicate unwashed bitter quinoa caused a significant food aversion and poor food conversion efficiency in rats. In the infant cereal production, processing quinoa reduced the concn. and membranolytic activity of saponins and increased its palatability and nutritional quality of the cereal product to a level similar to that of a wheat-based cereal product. GS

Chemistry(Analytical)

424

Giese (J). **Rapid techniques for quality assurance.** *Food Technology* 47(10); 1993; 52-56, 58-60

Various rapid test methods such as immunoassays (isotopic immunoassays, radioimmunoassays, fluoroimmunoassays, enzyme immunoassays), sensors (ion-selective electrodes, field-effect transistors, biosensors, immunosensors), near infrared spectroscopy, supercritical fluid extraction and colimeters can play a very important role in the quality assurance programs to ensure that food products meet safety and quality standards. CSA

425

Hitchcock (CHS). **Determination of hydrogen using a novel hydrogen-specific electronic sensor: A potential method for detecting irradiated food.** *Journal of the Science of Food and Agriculture* 62(3); 1993; 301-305

The results indicate that the detector is capable of distinguishing between irradiated and non-irradiated water through the quantitative detn. of the hydrogen generated during irradiation. This hydrogen diffuses away within 12 h if the water is left in an open vessel. The potenital application of the detector for monitoring irradiated food is limited to packaged or solid foods which retain the characteristic hydrogen marker. BV

426

Arvanitoyannis (I), Blanshard (JMV), Ablett (S), Izzard (MJ) and Lillford (PJ). **Calorimetric study of the glass transition occuring in aqueous glucose: Fructose solutions.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 177-188

Glass transition temp. (T_g) for dilute and concentrated glucose:fructose:water sol. have been determined by differential scanning calorimetry. The supplemented phase diagrams (glucose:fructose 1:4. 1:2, 1:1, 2:1, 4:1 (w/w)) are presented and from these the temp. (T'_g) and concn (C'_g) of the maximally freeze-concentrated glass have been determined. Theoretical predictions of T_g for binary (glucose:fructose) and tertiary (glucose:fructose:water) systems according to the Couchman-Karasz and Gordon-Taylor equations are given and discussed. Annealing vitrified glucose:fructose glasses above their T_g allows the glass concn. to approach C'_g as a result of ice formation. Viscosity measurements of fructose and fructose:glucose mixtures allow for a calculation of T_g of the non-aqueous sol. AA

427

Duran-Meras (I), Salinas (F), De La Pena (AM) and Rosas (ML). **Simultaneous determination of flavour enhancers inosine 5'-monophosphate and guanosine 5'-monophosphate in food preparations by derivative spectrophotometry.** *Journal of AOAC International* 76(4); 1993; 754-759

A derivative spectrophotometric method for the quantitative detn. of 2 flavour enhancers, inosine 5'-monophosphate (IMP) and guanosine 5'-monophosphate (GMP), singly and in binary mixtures is reported. Overlapping absorption spectra of both compounds were resolved by using first derivative spectrophotometry. By measuring the first derivative signals of IMP and GMP at 253 and 248 nm, respectively, simultaneous detn. was possible for IMP and GMP at 5-40 µg/mL, in the presence of up to 5000 µg/mL MSG. The method can be used satisfactorily to determine IMP and GMP in several food preparations. BV

428

Jickells (SM), Philo (MR), Gilbert (J) and Castle (L). **Gas chromatographic/mass spectrometric determination of benzene in nonstick cookware and microwave susceptors and its migration into foods on cooking.** *Journal of AOAC International* 76(4); 1993; 760-764

Benzene in poly(tetrafluoroethylene) (PTFE) coatings of nonstick cookware was determined by heating a small amount of coating in a sealed vial. GC/MS was used to analyze the vial headspace for benzene. A small survey (26 samples) of retail nonstick cookware detected benzene ranging from 2 to 50 µg/dm^2 in 7 samples. Nonstick frying pans with various polymer coatings were obtained directly from 1 manufacturer. Benzene (6-30 µg/dm^2) was detected in a number of these samples and was attributed to the use of a phenylmethyl silicone ingredient that contained benzene at 360 mg/kg. To determine the possible transfer of benzene from these coatings during normal use, several foods (puddings, cakes, and roast potatoes) were prepared in previously unused cookware. The foods were analyzed by using static headspace GC/MS. Benzene was not detected in any of these foods at a limit of detection of 2 µg/kg. In related studies, the detn. of benzene release from microwave susceptors was performed by heating the materials in a sealed system at 190°C for 4 min. Benzene release above 1 µg/dm^2 was not detected in 24 samples of susceptors. However, 1 specially supplied sample of non-metallized susceptor released 10 µg/dm^2 benzene when heated above normal anticipated temp. of usage (to 220°C). Foods such as french fries and pizza when cooked according to the manufacturer's instructions in susceptors contained no benzene with a limit of detection of 2 µg/kg. Even under abuse conditions of susceptors, the transfer of benzene to foods remained below this limit. AA

429

Espinosa-Mansilla (A), Munoz De La Pena (A) and Salinas (F). **Semiautomatic determination of furanic aldehydes in food and pharmaceutical samples by a stopped-flow injection analysis method.** *Journal of AOAC International* 76(6); 1993; 1255-1261

A kinetic study of the reactions of 5-hydroxymethyl-2-furfuraldehyde and furfural with 2-thiobarbuturic acid (TBA) by a stopped-flow injection analysis technique has been undertaken. A semiautomatic method for the analytical detn. of these furanic aldehydes is proposed on the basis of reaction with TBA. The proposed stopped-flow method was successfully applied to several commerical food samples. The procedure is faster than the earlier procedure for detn. of these compounds in foods. BV

430

Nakamura (Y), Tonogai (Y), Tsumura (Y) and Ito (Y). **Determinations of pyrethroid residues in vegetables, fruits, grains, beans and green tea leaves: Applications to pyrethroid residue monitoring studies.** *Journal of AOAC International* 76(6); 1993; 1348-1361

Detn. of natural pyrethrins and 12 synthetic pyrethroids in agricultural products was investigated. Vegetables and fruits were extracted with acetone, filtered after addition of coagulating sol., partitioned into n-hexane, and cleaned up on a Florisil column (as necessary). Pyrethroids were determined by GS/electron capture detection (GC/ECD) by using a methyl silicone-coated fused-silica capillary column, and recoveries were calculated by summing peak areas of the components. GC/MS was used to identify the pyrethroids detected by GC/ECD minitoring. Grains and beans containing lipids were analyzed by extraction with acetonitrile, partition into n-hexane, Florisil column cleanup, and capillary GC/ECD. The coagulation method was suitable for nonfatty crops such as vegetables, fruits, and green tea leaves, because recoveries were good and Florisil column cleanup was not needed in most cases. The coagulation method was not applicable to lipid-containing crops such as grains and beans because of low recoveries. Recoveries for 18 crops at fortification levels of 0.25 - 1.0 p.p.m. were 60.0 - 103.5%. No pyrethroids were detected from the non-fortified crops tested except green tea leaves, in which fluvalinate was detected at 0.89 p.p.m. AA

431

Pylypiw (HMJr). **Rapid gas chromatographic method for the multiresidue screening of fruits and vegetables for organochlorine and organophosphate pesticides.** *Journal of AOAC International* 76(6); 1993; 1369-1373

A rapid and reliable method was developed for the detn. of pesticides in fruits and vegetables. A 100 g sample is extracted with a mixture of 200 mL petroleum ether and 100 mL 2-propanol. The extract is backwashed 4 times, twice with aqueous sodium sulphate and twice with 350 mL distilled water, and then dried over 15 g sodium sulphate. The dried extract is analyzed by capillary GC with selective organochlorine and organophosphorus detection. The method determines primarily nonpolar pesticides, with recoveries ranging from 81 to 114%, and has an av. limit of detection of 10 p.p.b. for both detectors. AA

432

Sumitani (H), Suekane (S), Nakatani (A) and Tatsuka (K). **Inductively coupled plasma atomic emission spectrometric determination of tin in canned food.** *Journal of AOAC International* 76(6); 1993; 1374-1377

Samples of canned Satsuma mandarin, peach, apricot, pineapple, apple juice, mushroom. asparagus, evaporated milk, short-necked calm, spinach, whole tomato, meat, and salmon were evaluated. The amounts of tin found for the 50 and 250 μg/g levels were 50.5 and 256 μg/g, respectively, and the repeatability coeff. of variation were 4.0 and 3.8%, respectively. Recovery of tin from 13 canned foods spiked at 2 levels (50 and 250 μg/g) ranged from 93.9 to 109.4%, with a mean of 99.2%. The quantitation limit for tin standard sol. was about 0.5 μg/g. BV

FOOD MICROBIOLOGY AND HYGIENE

Bacteria

Enterobacter agglomerans

433

Alkorta (F), Amarita (F) and Rodriguez-Fernandez (C). **β-Galactosidase activity of *Enterobacter agglomerans* biotype 5.** *Lebensmittel-Wissenschaft und -Technologie* 26(4); 1993; 329-333

β-Galactosidase activity in extracts of *Enterobacter agglomerans* biotype 5 was studied after precipitation with 229 g/L of ammonium sulphate. This enzyme had max. activity at pH 7.6. Using p-nitrophenyl-β-D-galactopyranoside as substrate, V_{max} and K_m were estimated, and the effect of D-galactose, D-glucose and L-histidine on β-galactosidase activity were studied. Addition of alcohols resulted in a reduction of the β-galactosidase activity. Addition of the chelating agent EDTA produced inactivation. After treatment with EDTA, activity could be restored to some extent upon addition of Mg^{2+} and Ca^{2+}. Enzymatic activity vs. temp. was studied, obtaining the max. activity at 40°C and activation energy (E_a) was calculated giving a value of 64.85 kJ/mol. Preincubation was carried out at different times and temp., 10 min at 40°C resulted in a loss of enzymatic activity. If preincubated for 15 sec at 65°C the enzyme only retained 0.1 of the enzymic activity. AA

Lactobacillus reuteri

434

Speck (ML), Dobrogosz (WJ) and Casas (IA). ***Lactobacillus reuteri* in food supplementation.** *Food Technology* 47(7); 1993; 90, 92

The study deals with the beneficial qualities of *Lactobacillus*, nutritional benefits of *Lactobacillus reuteri* and the usage of lactobacilli as food supplements and it concludes that *L. reuteri* should be included with *L. acidophilus* and bifidobacteria as a dietary supplement. CSA

Pseudomonas

435

Eyles (MJ), Moir (CJ) and Davey (JA). **The effects of modified atmospheres on the growth of psychrotropic pseudomonads on a surface in a model system.** *International Journal of Food Microbiology* 20(2); 1993; 97-107

The growth patterns of the 4 *Pseudomonas* strains were initially compared at 15°C in air, 100% N_2 and 100% CO_2. The growth rates in air did not differ substantially from strain to strain. The growth rate of all strains were reduced slightly by incubation in 100% N_2, but final population was 1-2 $\log_{10}$ cfu/cm^2 lower in N_2 than in air. Incubation in 100% CO_2 caused substantial inhibtion of all strains. Atmospheres containing 20 or 40% CO_2 inhibited *Ps. fluorescens* and *Ps. putida* at 5 and 15°C. The inhibitory effect of CO_2 increased with the concn. of the gas and was greater at 5 than at 15°C. There were only small differences in the growth on pH 6.8 and 5.5 media in air. The effects of incubation in CO_2-enriched atm. at lower pH were greater than at pH 6.8. SRA

Staphylococcus aureus

436

Ballesteros (SA), Chirife (J) and Bozzini (JP). **Specific solute effects on *Staphylococcus aureus* cells subjected to reduced water activity.** *International Journal of Food Microbiology* 20(2); 1993; 51-66

The behaviour of *Staphylococcus aureus* cells subjected to lowered a_w by the addition of various solutes was examined by transmission electron microscopy. Solutes included NaCl, sucrose, propylene glycol, butylene glycol and various polyethylene glycols. Changes in other physical properties of the liquid growth medium brought about by the solutes were estimated theoretically. They did not correlate with the bacterial biological response. The inhibitory effects of sucrose and NaCl against *S. aureus* wre primarily ascribed to their a_w-lowering abilities, showing no significant specific solute effects. However, the other solutes examined showed specific antibacterial activity against *S. aureus* which may be compatilble with cell wall attack. AA

Fungi

Mushrooms

437

Chakravarty (DK). **Mushroom - an item of commerce.** *Indian Food Packer* 47(6); 1993; 12

Mushroom being rich source of protein can be well utilised for fighting malnutrition. By adopting appropriate technology for cultivation and processing, India can compete well in the Western market and earn plenty of foreign exchange. GS

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

Sweeteners

438

Rapaille (A) and Peter de Cock. **The incredible bulk-starch derived sweeteners.** *Indian Sugar* 43(11); 2994; 859-864

The basic and functional properties of traditional and speciality bulk sweeteners and their influence on food product characteristics in some applications are presented. SRA

CEREALS

Rice

439

Marsono (Y) and Topping (DL). **Complex carbohydrates in Australian rice products - influence of microwave cooking and food processing.** *Lebensmittel-Wissenschaft und -Technologie* 26(4); 1993; 364-370

Raw and parboiled white and brown rice from 3 Australian cvs (Calrose, Doongara and Waxy) were analysed for total and enzymatically resistant starch (RS), and for water-soluble and water-insoluble non-starch polysaccharide (NSP). Raw white and brown rice from these cvs were also analysed for starch and RS after cooking in a microwave oven or rice cooker and cooling or freezing of the cooked rice. Generally, starch was higher in white rice samples than in the corresponding brown rice and was higher in parboiled white and brown Calrose but not Doongara or Waxy. The starch content of white and brown rice was maintained or increased by cooking in a microwave oven or rice cooker except with Waxy. In extruded and drum-dried rice flour, rice-pop and rice cakes, starch content was the same as in the corresponding raw material. RS was higher in rice products and in brown and parboiled rice than in white rice and was often increased by cooling or freezing cooked rice but it never exceeded 1.5% of total starch. Total NSP were lower in white (1.8 - 2.3%) than brown rice (3.1 - 3.5%) and were increased slightly by parboiling. The ratio soluble/insoluble NSP was higher in white rice than in brown rice. NSP sugar composition varied between the 3 cvs and, in products made from Calrose, was also affected by processing. AA

MILLETS

Nil

PULSES

440

Rangasamy (P), Kasthuri (R), Gomathinayagam (P), Fazlullah Khan (AK), Murugarajendran (C), Nagarajan (P). **Study on relationship between methionine and total protein content in grain legumes.** *Madras Agricultural Journal* 80(12); 1993; 709-710

50 breeding lines/var. of different pulses viz., pigeonpea (*Cajanus cajan*), chickpea (*Cicer arietinum*), blackgram (*Vigna mungo*), green gram (*Vigna radiata*), cowpea (*Vigna unguiculata*), soybean (*Glycine max*), horse gram (*Macrotyloma uniflorum*), and lablab (*Dolichos lablab*) were analysed for their methionine and seed protein content. The mean seed protein was max. in soybean (42.36%) followed by lablab (26.51%) and low in bengal gram (17.90%). The protein content in soybean ranged from 39.46% (Co 1) to 46.49% (UGM 21) and in lablab from 23.83% (COLT 17) to 29.11% (CO 9). The variablity for methionine ranged from 6.09 to 18.98% and it was the greatest in Bengal gram (18.98%) followed by blackgram (17.70%) and cowpea (16%). The variability for total protein content

ranged between 2.69% (horsegram) and 14.83% (Bengal gram). GS

Beans

441

Saikia (L) and Ranganna (S). **Determination of thermal process schedule for beans.** *Indian Food Packer* 48(1); 1994; 17-37

D value obtained using - 10^3 spores $tube^{-1}$ was higher than those obtained with-10 spores $tube^{-1}$ in the brine of 4 types of beans. With D value, the Z values also increased. Procedure for comparing the heat resistance of the test organism with the classical values of *C. botulinum* and the correction for come-up time by graphical and formula methods are described. Methods for computation of F values with single segment and double segment approach and computation of corresponding process time (Pt) by improved graphical and formula methods are described. Checking with inoculated pack studies revealed that field beans, pigeon pea, broad bean and cluster bean required an F_0 values of 5.0, 4.6, 5.1 and 5.1 min. respectively with corresponding Pt values of 22.3, 18.5, 21.3 and 23.0 min. respectively. Pt values computed may not be adequate for commercial processing of beans. AA

442

De Valle (JM), Aguilera (JM), Hohlberg (AI), Richardson (JC) and Stanley (DW). **Modelling of bean hardening kinetics during storage.** *Journal of Food Processing Preservation* 17(2); 1993; 119-137

Two kinetic models (empirical and logiotic) were adapted to predict storage induced hardening of black and white beans. In this study hardening showed a lag period, followed by a period of fast hardening, and ending in a period of declining hardening rate as hardness plateaued to equilibrium values at adverse storage conditions. Hardening rates increased with either the water activity of beans or storage temp. KAR

443

Li (Z), Alli (I) and Kermasha (S). ***In-vitro* α-amylase inhibitor activity-phytate relationships in proteins from *Phaseolus* beans.** *Food Research International* 26(3); 1993; 195-201

Citric acid extracted, crystalline proteins and alkali extracted non-crystalline proteins from 4 types of *Phaseolus* beans were investigated for α-amylase inhibitory activity. The influence of phytate on the α-amylase inhibitory activity was also studied. The inhibitory activities of the non-crystalline proteins were higher than those of crystalline proteins. All proteins showed α-amylase inhibitory activity and contained phytate which correlated statistically ($r = 0.68$, p less than or equal to 0.01) with the α-amylase inhibitory activity. Free phytate did not inhibit α-amylase activity; however, phytate in combination with protein was inhibitory. The observed α-amylase inhibition of the bean proteins could be due to the presence of proteinaceous α-amylase inhibitor and/or a phytate protein complex with high inhibitory activity. AA

Flaxseeds

444

Oomah (BD) and Mazza (G). **Processing of flaxseed meal: Effect of solvent extraction on physicochemical characteristics.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 312-317

The effect of methanol, aqueous methanol and aqueous methanol-ammonia as primary extraction solvents on the physicochemical characteristics of flaxseed meal were investigated. Extraction by all solvents significantly reduced particle size, decreased water hydration capacity and affected the colour of flaxseed meal. Solvent extracted meal exhibited substantial improvement in emulsifying capacity and foaming characteristics, but its viscosity was reduced. Changes in the physicochemical characteristics of flaxseed meal were influenced by the degree of polarity of the primary extraction solvent. Foaming capacity and viscosity of flaxseed meal increased with increase in protein concn. The shear thinning behaviour of flaxseed meal was affected by protein concn., NaCl concn. and solvent extraction. AA

Lupins

445

Chango (A), Villaume (C), Bau (HM), Nicolas (JP) and Mejean (L). **Debittering of lupin (*Lupinus luteus* L.) protein by calcium alginate and nutritional evaluation.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 195-200

A new process for debittering lupin (*Lupinus luteus* L.) protein by coagulating in an aqueous medium was developed. The proteins of whole bitter yellow lupin seed (BYL) were solubilized in an aqueous medium with alginic acid then coagulated in a bath of $CaCl_2$. This process was also applied to sweet yellow lupin seeds and sweet white lupin, which are low alkaloid var. Crude protein content of the concentrates from the 3 var. of lupin seeds and the yield at different pH levels were determined. The protein efficiency ratio of the low alkaloid protein concentrate (LAPC) from BYL was determined. The daily protein intake of LAPC diet was close to that of the untreated bitter seed diet. However, the wt. gain was lower (0.23 plus or minus 0.16 compared to 0.35 plus or minus 0.17 g day^{-1}). Wt. gains for both lupin diets were considerably less than for rats fed a casein diet (4.74 plus or minus 0.49 g day^{-1}). Protein intake of LAPC supplemented with 2% (w/w) DL-methionine was comparable to that of casein (1.5 g day^{-1}). However, the wt. gain and the PER were significantly different: 3.66 plus or minus 0.62 g day^{-1} and 2.02 plus or minus 0.20 g day^{-1}, respectively, for rats on the low alkaloid protein diet supplemented with methionine compared with 4.74 plus or minus 0.49 g day^{-1} and 2.50 plus or minus 0.15 g day^{-1} for rats on the casein diet. AA

Mungbeans

446

Galvez (FCF) and Resurreccion (AVA). **The effects of decortification and method of extraction on the physical and chemical properties of starch from mungbean (*Vigna radiata* (L.) Wilczec).** *Journal of Food Processing Preservation* 17(2); 1993; 93-107

Three extraction methods were examined to isolate the starch from either whole or decorticated mungbean. Significantly higher starch yield and efficiency of extraction were obtained when water was used as the steeping medium using whole or decorticated beans. Higher values were obtained with decorticated buds, the use of either a long settling time (4-6 h) or a short soaking time (4 h) with a longer grinding time (3 min) and short settling time (3 h) produced the starch with all the desirable characteristics for mungbean - noodle manufacture. KAR

OILSEEDS AND NUTS

447

Dusterhoft (E-M), Bonte (AW) and Voragen (AGJ). **Solubilisation of non-starch polysaccharides from oil-seed meals by polysaccharide degrading enzymes.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 211-220

The solubilisation of non-starch polysaccharides from cell wall materials (CWM) of palm-kernel and sunflower meals was studied using multi-component polysaccharidase preparations or fractions thereof. In sunflower CWM, the degradability of pectic compounds and mannose-containing polysaccharides was highest, as estimated from 40 to 70% solubilization of their constituent monosaccharides arabinose, galactose, galaturonic acid, rhamnose and mannose. Dimers and monomers were produced as major neutral and acidic end-products. Mannans in palm-kernel CWM were hydrolysed to about 20-50%, depending on enzyme composition, with the monomer and dimer of mannose as major end products. In both materials, xylans, or other xylose-containing polymers, were most resistant to enzymic hydrolysis. The results indicate the preferential solubilization of parenchyma tissues from the seed in sunflower meal and the endosperm in palm-kernel meal, and the resistance of sunflower hull and palm-kernel endosperm to enzymic attack. The concn. of notably cellulolytic, mannanolytic and arabinolytic activities clearly determined the extent to which the corresponding constituents were solubilised. AA

Sal seed

448

Gandhi (VM), Cherian (KM) and Mulky (MJ). **Studies with sal tannins and a simple chemical test for assaying sal seed meal toxicity.** *Journal of the Oil Technologists Association of India* 26(1): 1994: 3-6

Ammoniation could detoxify sal meal tannins without any change in assayable tannin content of the meal. Paper chromatographic and UV spectral characteristics showed differences between tannins from untreated and ammoniated sal seed meals as well as tannic acid. The precipitation of egg white with tannin extracts from untreated sal seed meal and its absence with an extract from ammoniated sal seed meal is taken advantage of for assessing the toxicity of the meal. The amount of precipitation decreased at higher levels of ammoniation and the test can be used to assess the extent of detoxification of tannins. AA

449

Gandhi (VM), Cherian (KM) and Mulky (MJ). **Toxicity studies on untreated and ammoniated sal tannins.** *Journal of the Oil Technologists Association of India* 26(1): 1994: 7-11

A high (42%) tannin containing extract of sal seed meal as such and after ammoniation was examined by oral, intraperitoneal and intravenous injection in mice and rats in acute toxicity studies. The ammoniated sal tannins were non-toxic in comparison to the untreated tannins from sal. Confirmation of detoxification of tannins by ammonia was obtained through similar tests with a pure sample of tannic acid. Subacute feeding studies in rats with both the ammoniated and untreated tannin extracts of sal seed meal were also carried out using 12, 24 or 40% incorporation of the extracts i.e., at tannin levels of 5, 10 and 16.8 g % (equivalent to material from 60, 120 or 200 g of sal seed meal in 100 g diet) in diets containing 10% casein. Ammoniation reduced the toxicity of sal tannins and is the prime mechanism of detoxification of sal seed meal. AA

Soybeans

450

Oner (MD), Tekin (AR) and Erdem (T). **The use of soybeans in the traditional fermented food - *Tarhana*.** *Lebensmittel-Wissenschaft und - Technologie* 26(4): 1993: 371-372

Tarhana - a most widely consumed fermented foods in the Middle East and Turkey is produced from yoghurt and wheat. In this work, wheat flour was replaced totally or partially with soybean. Protein concn. of the product was doubled with the use of soybean. With this specific production technique, no beany off flavour was noticed. Sensory scores indicated that *tarhana* was an excellent choice for soybean utilization in traditional foods. BV

Soy products

451

Pallavi (S), Usha (MS), Pratima (A) and Chauhan (GS). **Defatted soyflour substitution in some traditional foods. 1. Effect on sensory characteristics.** *Beverage and Food World* 20(3): 1993: 7-10

Chickpea flour and wheat flour were substituted by defatted soy flour (DSF) in 3 snacks (*muruku*, *nankhatai*, and *Mysore pak*). Sensory evalaution of snacks showed that DSF substituted snacks 25% in *muruku*, 15% in *nankhatai* and 100% in *Mysore pak* were acceptable (82.8%). SRA

Soy milk

452

Tuitemwong (P), Erickson (LE), Fung (DYC), Setser (CS) and Perng (SK). **Sensory analysis of soy yoghurt and frozen soy yoghurt produced from rapid hydratio hydrothermal cooked soy milk.** *Journal o Food Quality* 16(3): 1993: 223-239

Sensory studies have been conducted o flavoured soy yoghurt (FLAVSYO) and froze flavoured soy yoghurt (FROZSYO) made from rapid hydration hydrothermal cooked soy milk. Trained panel testing was conducted with a panel of 5. Consumer acceptance tests were carried out with 195 consumers using standard 9-point hedonic scales. The frequencies of the consumers who liked FROZSYO were high at like slightly to like extremely the FLAVSYO and FROZSYO had less beany flavour than the soy milk. The data from the trained panel indicate that processing, fermentation, and flavouring significantly changed the major attributes. Relative to unflavoured soy yoghurt, the beany flavours, chalkiness, aftertaste, sweetness, uniformity, and mouth coating scores of the FLAVSYO and FROZSYO were closer to the corresponding sensory scores for the commercial yoghurt. AA

Soy proteins

453

Mao (L-C), Lee (K-H) and Erbersdobler (HF). **Effects of heat treatment on lysine in soya protein.** *Journal of the Science of Food and Agriculture* 62(3); 1993; 307-309

Total lysine and available lysine were used for predicting the damage to lysine in soya protein heated with glucose and in alkali. The amounts of both types of lysine decreased during the treatments. The content of total lysine was much higher than that of available lysine. In soya protein heated with glucose, the available lysine content decreased by 78 - 85% and that of total lysine by 17-40%. In soya protein heated in alkali, available lysine decreased by 7-24% and total lysine by 7-13%. Since available lysine was more sensitive, changes in total lysine underestimated the nutritional damage. AA

TUBERS AND VEGETABLES

Cassava

454

Giraud (E), Gosselin (L) and Raimbault (M). **Production of a *Lactobacillus plantarum* starter with linamarase and amylase activities for cassava fermentation.** *Journal of the Science of Food and Agriculture* 62(1); 1993; 77-82

The use of *Lactobacillus plantarum* strain A6 in cassava fermentation as starter for gari production was analysed. A lower final pH, a faster pH decline rate and a greater production of lactic acid (50 g kg^{-1} DM) was observed. The starter did not influence cassava detoxification. GS

Potatoes

455

Shomer (I), Rao (MA), Bourne (MC) and Levy (D). **Impact of temperature and cellulase treatments on rheological behaviour of potato tuber cell suspensions.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 245-250

The rheological behaviour of suspensions of potato tuber cells after gelatinization of starch and enzymatic degradation of cellulose was studied. Elevating temp. from 20 to 70°C resulted in a respectively increase in storage modulus (G') and decrease in loss modulus (G") and complex dynamic viscosity (η^*). The gelatinized starch behaves as an inflationary agent affecting cell elasticity and friction. Degradation of the cell wall by cellulase reduced G', G" and η^* at all oscillation frequencies. Enzymatic degradation of the cell wall exhibited apparent second-order behaviour in relation to G' and η^*. Enzymatic removal of the cell wall resulted in the breakdown of the cell structure, dispersion of the intracellular starch, and liquefaction. AA

Vegetables

456

Prakash (D), Nath (P) and Pal (M). **Composition, variation of nutritional contents in leaves, seed protein, fat and fatty acid profile of *Chenopodium* species.** *Journal of the Science of Food and Agriculture* 62(2); 1993; 203-205

The foliage of *Chenopodium* belonging to 10 species were analysed for selected nutritional and antinutritional components. The overall range of moisture was 757-910 g kg^{-1}, carotenoid 78-190 mg kg^{-1} vitamin C 0.5-2.4 g kg^{-1}, protein 26-64 g kg^{-1}, nitrate 2.6-5.0 g kg^{-1} and oxalate 9-39 g kg^{-1} (fresh wt.). Variation of all the 6 parameters with respect to leaf position from the apex showed the highest amount of carotenoid at 7-8, vitamin C at 9-10, protein at 5-6 and nitrate in the youngest leaves, followed by a continuous decrease with age (increasing position). However, oxalate contents always tended to increase with leaf position (age). The protein, fat and fatty acid composition in seeds of 8 species were also analysed. Protein varied from 106 to 142 g kg^{-1} and fat from 30 to 62 g kg^{-1}; palmitic, oleic and linoleic were the major fatty acids in the oils. AA

457

Dieckmann (A), List (D) and Zache (U). **Cold water mist humidification to preserve the quality of fresh vegetables during retail sale.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 340-346

The effects of water misting on the maintenance of quality of field-lettuce head-lettuce, broccoli, chicory and carrots, under retail trade storage conditions were analysed. The results were, compared with samples which were stored without misting. Water misted crops (e.g. spraying time of 6 sec, interval of 20 min) have far lower wt. losses and a lower increase of dry matter. The texture (firmness and crispness) of the raw material was preserved for much longer. Thereby an evidently slower decrease in the ascorbic acid content was found. An impact on clour was not observed. Misted as well as non-misted vegetables showed an increase in the number of microorganisms/g within the same log cycle only. AA

Cucumbers

458

Neelima (G), Tandon (DK) and Kalra (SK). **Lactic acid fermentation of cucumber for pickling.** *Beverage and Food World* 20(3); 1993; 17-18

A lab. scale trial of lactic acid fermentation of cucumber was conducted under ambient temp. of 30-35°C to evaluate its stability under Indian conditions. Salt stocked cucumbers could be used for preparation of sweet sour sliced or mixed type of pickle after desalting. Increasing the concn. of salt inhibited undesirable microorganism and promoted growth of lactic acid bacteria (LAB). Cucumber juice extract at this level was found to be an excellent medium for LAB which converts sugar into lactic acid. After completion of 28 days fermentation, the cucumber could be consumed as such or packed and pasteurized. The sour pickle (in 2% acetic acid) could successfully be stored upto 3 months. The pickle as such was too sour for consumption and acidity could be reduced by dipping the cucumber in 5% $CaCl_2$ sol. The sensory quality of pickle showed acceptable sourness (0.55% acidity) with firm texture and desirable flavour. SRA

Leafy vegetables

Saag

459

Geeta (L), Sadana (B) and Nagi (M). **Sensory evaluation of *saag* prepared from bathu (*Chenopodium album*), carrot (*Dauces carota*) and radish (*Raphanus sativus*) leaves.** *Beverage and Food World* 20(5); 1993; 10, 11

Seven recipes of *saag* a tradition leafy vegetable preparation of Punjab, namely Bathu saag (B_1), Bathu + spinach saag (B_2, 2:1), carrot saag (C_1), carrot + spinach saag (C_2, 2:1), radish saag (R_1), radish + spinach (R_2, 2:1) and spinach (S_1) were developed and evaluated. Sensory evaluation showed R_2 as the most acceptable followed by B_1 and B_2 respectively. BV

Tomatoes

460

Vijay Sethi. **Efficacy of various preservatives for preserving whole tomato concentrate.** *Indian Food Packer* 48(1); 1994; 11-15

Whole tomato concentrate could be stored upto 9 months at 24-38°C with good retention of lycopene without any spoilage when preserved with 100 p.p.m. each of SO_2, sodium benzoate, and methyl parabens followed by 200 p.p.m.

each of SO_2 and sodium benzoate. Microbial spoilage could not be controlled either with 750 p.p.m. of sodium benzoate of 400 p.p.m. SO_2 or 200 p.p.m. methyl parabens or 0.5% acetic acid. Additive effect of mixed preservatives was observed at various storage temp. AA

461

Thiagu (R), Nagin Chand and Ramana (KVR). **Evolution of mechanical characteristics of tomatoes of two varieties during ripening.** *Journal of the Science of Food and Agriculture* 62(2); 1993; 175-183

Mechanical characteristics of tomatoes of 2 var. (Pusa Ruby and Vashali hybrid) were studied at various stages of ripening by whole fruit compressiong (WFCT) and Magness-Taylor penetration (MTPT) tests on an Instron Universal Testing Machine, Model 140. Rupture/penetration force, deformation at rupture/penetration, stiffness and work done were computed from the respective force-deformation, curves for WFCT and MTPC for various ripening stages of both varieties. All the parameters, except deformation at rupture under WFCT, showed highly significant variations with ripening. The fruits of both var. showed significant differences in all parameters obtained by WFCT except in stiffness. The tomatoes of the Vashali hybrid were firmer requiring 20-50% extra force to rupture/puncture at all stages of ripening compared with Pusa Ruby. The deformation at penetration increased 4 times more rapidly, with ripening, for Pusa Ruby compared with the Vashali hybrid. After breaker stage, Pusa Ruby fruits required more energy (work) for penetration as most of the energy was spent in deformation rather than puncturing. The overestimate of work of compression or penetration when approximated by linear force deformation curve as significant at the 99.9% level. Except for deformation under WFCT (for the Vashali hybrid) and work done under MTPT (for Pusa Ruby), all the other parameters showed good correlations between them. Empirically selected inverse and power law models adequately described the variation in most of the parameters with ripening index and both the models were equally suited for the purpose. AA

FRUITS

462

Samaddar (HN). **Production and processing of fruits and vegetables in India with special reference to West Bengal.** *Indian Food Packer* 47(6); 1993; 7-11

Gives an overview of the production of fruits (mango, banana, pineapple, guava, mandarin orange etc.), vegetables, spices (chilli, ginger, turmeric, etc.), plantation crops (cardamom, cashewnut, coconut, etc.), needs and gaps in the industry in India and West Bengal in particular. GS

463

Charanjit Kaur and Khurdiya (DS). **Improvement in the quality of fruit nectar.** *Beverage and Food World* 20(3); 1993; 15, 16, 18

Trials were conducted on the improvement in the quality of nectar of pineapple, apple, plum and orange by blending with mango pulp in the ratio of 0:4, 3:1, 1:1, 1:3 and 4:0 respectively. The products were analysed for pH, TSS, acidity, sugars, Carotenoids and sensory quality. Results showed 15% TSS, 0.32 - 0.28% acidity ascorbic acid varied from 1.85 - 4.25 mg/100 g in ratios 0:4 - 4:0 in pineapple blended nectar, reducing sugars increased from 1.87 - 4.56% in 4:0 ratios, no specific trend observed in total sugars, carotenoids of mango pulp in blended nectar increased from 119.56 μg/100 g (1:3) to 886.41 μg/100 g (4.0). Overall acceptability was highest for blended nectar of mango with pineapple, apple, orange and plum in the ratio 2:2, 3:1, 3:1 and 1:3. SRA

Apricots

464

Rossello (C), Canellas (J), Santiesteban (I) and Mulet (A). **Simulation of the absorption process of sulphur dioxide in apricots.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 322-328

The absorption process of sulphur (IV) in the 2 major apricot var. of Majorca has been simulated, assuming the existence of 2 diffusive species. The diffusivity value of the 2 species SO_2 (aq) and HSO_3, has been obtained by a numerical method of non-linear regression analysis. The dependence of the absorption on the sol. operating conditions including temp., pH and $Na_2S_2O_5$ concn. has been evaluated. The proposed diffusive model is able to explain 95% of the variance. This model can be also applied to sulphiting of other food products. AA

Avocadoes

465

Yahia (EM) and Carrillo-Lopez (A). **Responses of avocado fruit insecticidal O_2 and CO_2 atmospheres.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 307-311

Atmospheres with less than or equal to 0.5% O_2 and greater than or equal to 60% CO_2 have been shown to be insecticidal. Avocado fruit (*Persca americana* Mill., cv. Hass) were exposed to air and to a modified atm. (MA) containing 0.1 to 0.44% O_2 and 50 to 75% CO_2 at 20°C for 0 to 5 days. The fruits were evaluated every day, immediately after removal from MA and after ripening in air at 20°C. Fruit exposed to MA for more than 1 day and then ripened in air had exocarp and mesocarp injury. Fruit in MA for more than one day had decreased concn. of 3 glycolytic metabolites: glucose 6-phosphate, fructose 6-phosphate and 2-phosphoglycerate. Other metabolites were not affected. Insecticidal MA can only be used as a potential insect control treatment in avocado fruit for periods of 1 day or less. AA

Bananas

466

Bhavani Shankar (K) and Madhava Rao (VN). **Nutritional investigations in banana nendran.** *Madras Agricultural Journal* 80(12); 1993; 708-709

Nitrogen application profoundly influenced the quality of 'Nendran' banana fruits. Among the three levels of N treatment, starch content was highest at N_2 level (100 g/plant) and declined at N_3 level (250 g/plant). At all levels of N, increasing the P level from 15 to 30 g and 45 g/plant had no significant influence on starch content. The carotene content in fruit was higher at 100 g N and 30 g P/plant among the different levels supplied. The carotene content declined with increase in the dose of N added beyond 100 g/plant. Application of 100 g N, 30 g P and 300 g K/plant improved the carotene content. GS

467

Wade (NL) and Shashirekha (HS). **Increase in low molecular size uronic acid in ripening banana fruit.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 257-259

The role of exopolygalacturonase in increasing low mol. size uronic acid Cavendish banana fruit ripening was analysed. There was a decrease in the uronic acid content of the cell wall material of the edible pulp and increase in low mol. size uronic acid soluble in aqueous ethanol or phenol/acetic acid/water ratio. GS

Guavas

468

Patel (AB), Patel (BI) and Katrodia (JS). **Extension of storage life of guava (*Psidium guajava* L.) fruits.** *Indian Food Packer* 48(1); 1994; 5-10

The efficiency of different growth regulators and wax emulsion in increasing the storage life of guava fruits was evaluated. Min. wt. loss was recorded in the fruits treated with wax emulsion 12 and 6% on 3rd, 6th, 9th and 12th day of storage. Colour changes were faster in control followed by 2, 4-D 100 p.p.m. and 200 p.p.m. and (cycocel) 500 and 1000 p.p.m., while it was slower in fruits treated with wax emulsion 6 and 12% followed by GA 150 and 300 p.p.m. Higher marketability was found in fruits treated with wax emulsion 12 and 6% and 2, 4-D 100 p.p.m. on 6th, 9th and 12th day of storage. The treatment with 2,4-D 100 p.p.m. before storage increased total sugars on 3rd and 6th day of storage. Thus 2,4-D-100 p.p.m. and wax emulsion 12% and 2,4-D 200 p.p.m. and wax emulsion 6% were most effective to delay ripening and extend the shelf-life of guava fruits. GS

Jack fruits

469

John (PJ), Balasubramanyam (N) and Narasimham (P). **Effect of packaging, processing and storage conditions on the quality of raw jack fruit curry in flexible pouches.** *Journal of Food Processing Preservation* 17(2); 1993; 109-118

"Ready to eat" raw jack fruit (*Artocarpus heterophyllus* Lam.) curry (pH 4.2), having acidic tomato gravy, packed in a flexible pouch with/without vacuum and heat processed in boiling water for 30 min, was stored at 3 different conditions, room temp. (28°C), refrigerated low temp. (4°C) and frozen state (-18°C). The vacuum packed product, placed in a secondary pack of polyester/foil/polyethylene laminate had a storage life of 120, 270 and more than 360 days at 28, 4 and at -18°C, respectively. The stored product was safe microbiologically and had an acceptable sensory quality. AA

Lemon

470

Macdonald (HM), Evans (R) and Spencer (WJ). **Purification and properties of the major pectinesterases in lemon fruits (*Citrus limon*).** *Journal of the Science of Food and Agriculture* 62(2); 1993; 163-168

Pectinesterase from lemon was separated into 7 fractions by chromatography on CM-Sephadex C-50. Purification was hindered by the presence of pectin, for which the pectinesterase had a high affinity. Two major pectinesterases were purified: one was located solely in the peel and the other in the endocarp. They possessed similar mol. wts. (35 kDa and 33 kDa, respectively) and high isoelectric points (> 11, and c 9). They required the presence of cations for optimal activity, the peel pectinesterase requiring a higher concn. of cations than the endocarp enzyme. Both enzymes were completely inactivated at temp. above 88°C. Although neither enzyme destabilised the cloud of lemon juice or of comminuted lemon beverages, they caused cloud destabilisation of orange juice. AA

Mangoes

471

Sahni (CK) and Khurdiya (DS). **Mango yoghurt - a non conventional product.** *Beverage and Food World* 20(5); 1993; 23

Mango-yoghurt was tested for its acceptability at lab. scale. Increase of the pulp content in mango-yoghurt imparted a good flavour to the product. The mango yoghurt with 20% mango pulp, 25% TSS and 1% acidity was adjudged the best. SRA

Passion fruits

472

Senter (SD), Payne (JA), Knight (RJ) and Amis (AA). **Yield and quality of price from passion fruit (*Passiflora edulis*), Maypops (*P. incarnata*) and tetraploid passion fruit hybrids (*P. edulis* x *p. incarnata*).** *Journal of the Science of Food and Agriculture* 62(1); 1993; 67-70

Peaches

473

Robertson (JA), Meredith (FI), Lyon (BG) and Chapman (GW). **Comparison of quality characteristics of three nonmelting Clingstone peach selections.** *Journal of Food Quality* 16(3); 1993; 197-207

The effect of maturity and ripening on the quality characteristics of 3 nonmelting Clingstone peach cvs was compared. In general, size, wt., Minolta "a" values and SS/TA increased significantly with increased degree of maturity of fruit as harvested; whereas, firmness, hue angle, acidity and total pectins decreased significantly. Ripening for 7 days at 20°C resulted in softening of L9-A47-33 and Babygold 7 peaches but had no significant effect on the firmness of FLA 9-20C. Ripening appeared to have little effect on the chemical characteristics of all 3 cvs except for water soluble pectin, which increased slightly. L9-A47-33 peach selection was significantly more fruity, peachy, sweet, juicy and had a higher overall acceptance score than Babygold

7 or FLA 9-20C, indicating it might have potential for fresh market use. AA

Pears

474

Attri (BL), Lal (BB) and Joshi (VK). **Technology for the preparation of sand pear vermouth.** *Indian Food Packer* 48(1); 1994; 39-46

Fully ripened sand pear (*Pyruspyrifolia* L.) fruits were washed, grated manually and sprayed with 1% ascorbic acid sol. to check browning. Juice was extracted in a basket press from the grated material wrapped in a cloth and heated to 85°C. Sand pear must was prepared after ameliorating the TSS of the juice to 24°B with sugar syrup. Pectinol at 0.5%, diammonium hydrogen phosphate at 0.1% and potassium metabisulphite at 100 p.p.m. SO_2 were added. The rate of fermentation (RF) of sand pear must during the first 5 days was the highest but lowered down in the subsequent period of fermentation and completed in 10 days with an RF of 1.58°B/24 h. TSS, acidity, alcohol, aldehydes, phenols and esters increased in the vermouth than the base-wine while pH, ascorbic acid and optical density decreased. Sand pear juice can be fermented into wine and then vermouths of acceptable chemical and sensory qualities. GS

CONFECTIONERY, STARCH AND SUGAR

Confectionery

475

Bianco (ML). **Panned pieces.** *Manufacturing Confectioner* 73(11); 1993; 77-79

This presentation covers product evaluation of panned pieces. Product categories included are soft panning, hard panning, chocolate panning and chocolate finishing. SRA

Candies

476

Cooley (J). **Quality jelly candy: A synergy of art and science.** *Manufacturing Confectioner* 73(11); 1993; 69-76

Aspects covered include: functional ingredients (reducing sugars, inert sugar, stabilizers, water, acids, flavour and colour, finishing agent), cooking method (open kettle, jet cooking, swept surface heat exchangers, static cooker), formulation/processing, gelation 'gummy' jellies, fruit snack for extrusion, pectin jellies, gum arabic, jelly forming methods, mould shapes, moulding starch, starch condition, drying conditions, product finishing, quality assurance, incoming starch (particle size, odour and flavour, fluidity/viscosity, extraneous matter), premix and slurry (formulation accuracy, gelling agent percentage, solids content, degree of cook, clarity, board wt., tailing, colour and flavour), moulding starch (moisture, temp.), drying parameters (oil content, extraneous matter, microbiological testing, cold H_2O solubles) drying conditions (time, temp. and air flow). 4 references. SRA

477

Rothman (L). **Butterscotch and butter toffee candies.** *Manufacturing Confectioner* 73(11); 1993; 59-63

The perceptible product attributes is described in this paper. Aspects covered include product characteristics, product stability, market size, quality parameters, product design, product testing and product uniformity. SRA

Chocolates

478

Hofberger (R). **Chocolate - differentiating the tastes.** *Manufacturing Confectioner* 73(11); 1993; 64-68

This paper presents colour, fitness of texture, compatibility with product centres, packaging flavour pickup and course formal taste test evaluation of chocolate. Matching the chocolate with the confection, maintaining product identity, triangle taste test, preference test, Robinson test and perception of taste are the other aspects covered. SRA

Sugar

479

Hartel (RW). **Controlling sugar crystallization in food products.** *Food Technology* 47(11); 1993; 99-104, 106-107

The purpose of this article is to combine the principles of crystallization, glass transition theory and state diagrams to give a better understanding of what is necessary to control sugar crystallization in food products. CSA

Sugarcane

480

More (NB), Patil (JP), Wandre (SS) and Hasabnis (AB). **Comparative study of some sugarcane varieties in relation to yield and quality.** *Indian Sugar* 43(9); 1993; 695-698

Yield and quality of sugarcane var. CO 8330, CO 8333, CO 8325, CO 8326, CO 8314, CO 8331, CO 740, CO 7219 were studied at Regional Sugarcane and Jaggery Research Station, Kolhapur, India. CO 8325 was the best in productivity (105.36 t/ha) and that of commercial cane sugar (14.57 t/ha). The same trend was repeated in ratoons. In cane yield quality CO 740, CO 7219 and CO 8330 var. were on par with CO 8325. SRA

481

Patel (HS), Naik (PL), Patel (MP) and Mehta (NJ). **Phosphorus nutrition under continuous cropping system of sugarcane.** *Indian Sugar* 43(9); 1993; 699-703

Regional Sugarcane Research Station, Navasari, Gujarat, India, studied the response of sugarcane to P under continuous cropping system. 3 levels of P_2O_5 (0, 62.5 and 125 Kg-ha) were tried in fresh crops along with 250 kg/ha of N and 125 kg/ha K_2O under heavy rain fall. The cane and sugar yields of plant crops were significantly enhanced with increase in P level. The highest cane yield of 110.69 t/ha was registered with 12.5 kg P_2O_5/ha. SRA

482

Balusamy (M), Parameswaran (P) and Shanumugasundram (VS). **Studies on non-monitory and monitory inputs like seed rate, spacing and N levels on yield and quality of sugarcane.** *Indian Sugar* 43(10); 1994; 771-774

Individual and combined effect of both monitory and non-monitory inputs like spacing, seed rate and N levels in sugarcane were studied at Agricultural Research Station, Bhavanisagar, Tamilnadu, India. Seed rate of 1.875 lakh buds/ha in 60 cm row spacing recorded higher cane yield. N application at 150% recommended level also recorded higher cane yield. However, incremental levels had significantly reduced the juice quality showing the deleterious effect of higher dose N and lowering CCS t/ha. AA

483

Nigade (RD), Kadam (BK) and Jadhav (SB). **Studies on the optimum period of harvesting sugarcane varieties in suru season.** *Indian Sugar* 43(12); 1994; 911-916

Of the 3 sugarcane var. CO-7527, COC-671 and COM-7125 tested in 1988-89, 89-90 and 90-91, COM-7125 yielded max. cane yield. Harvesting of cane in 2nd wk at 14 month crop registered the highest cane production. COM-7125 was good for delayed harvesting of the test var. SRA

484

Shiv Kumar and Srivastava (SNL). **Effect of planting methods and intercrops on yield and quality of spring planted sugarcane.** *Indian Sugar* 43(12); 1994; 919-922

The effect of planting methods and companion crops (black gram, green gram, cow peas, maize and sunflower) with spring planted sugarcane was examined in 1989-90, 1990-91 at Uchani, Karnal, India. Of the 3 methods of planting sugarcane and intercrops studied, the paired row 50:100 planting proved superior over normal row 50:100 planting proved superior over normal row and skip row - 4th row unsown methods. All the sugarcane + inter crop combinations reduced cane yielded significantly. Sucrose and CCS% were not affected by inter cropping or planting methods. SRA

485

Mrig (KK) and Chaudhary (JP). **Comparative efficacy of soil insecticides on incidence of shoot, root borers and black bug in sugarcane ratoons.** *Indian Sugar* 43(12); 1994; 923-929

Gamma HCH, heltachlor, aldrin, endosulfan emulsions, carbofuran and phorate granules and HCH dust were examined for the control of shoot, root borers and black bug, Gamma HCH applied in April gave significantly superior result than other insecticies reducing the shoot borer incidence upto 7.3%, aldrin incidence, 11.9%, heptachlor emulsions, 13.4% and HCH dust, 14.2% whereas endosulfan the poorest response, 17.6%. The insecticides applied in April did control root borer. Gamma HCH applied for the control of shoot borer, was also effective in reducing incidence, 88.0% black bug population followed by aldrin (85.5%), HCH dust (84.9%) and heptachlor (84.3) 86.63 thousand/ha and productivity 50.7 t/ha was significantly higher with Gamma HCH than all other formulations. AA

Sugarcane juices

486

Desai (BB), Chavan (UD) and Naik (RM). **Effect of chlorosis on the quality of sugarcane juice.** *Indian Sugar* 43(10); 1994; 779-780

Sugarcane plants, healthy and chlorotic, were analysed for the quality. Influence of chlorosis adversely affected the quality of juice. The severity of chlorosis was evident from the lower values of total chlorophyll contents (-71.81 to -96.18%). Chlorosis of sugarcane plants markedly decreased total sugars in the range 14.22 - 17.18%, juice purity in the range 69.21 - 75.13% and augmented reducing sugar content in the range 1.00 - 0.80%. SRA

BAKERY PRODUCTS

487

Goyle (A) and Dugar (N). **Quality evaluation of three canteen snacks: Nutritive, fat and bacteriological.** *Indian Food Packer* 48(1); 1994; 53-58

Proximate composition, oil quality and bacteriological quality of samosa, dal-ki-kachori and bread pakora collected from canteen and lab. were evaluated. Protein content of the snacks ranged from 5.38 (samosa) to 10.73 g/100 g (bread pakora), fat content from 11.5 (bread pakora) to 30.5 g/100 g (dal-ki-kachori), crude fibre content from 0.20 to 0.59 g/100 g, mean ash content from 0.42 to 1.11 g/100 g/, carbohydrate contents from 27 to 44 g/100 g and energy contents from 249 to 475 kcal/100 g. Oils extracted from the canteen snacks was found inferior compared to that of lab. snacks. Canteen snacks were contaminated with *Staphylococcus*. GS

488

Menon (CPS). **Raw materials for baking.** *Indian Miller* 24(3); 1993; 35-38

Raw materials used in bakery products such as bread, biscuits, Danish pastry, puff pastry, pizza, buns, sandwich cream products are described. SRA

489

Slade (L), Levine (H), Ievolella (J) and Wang (M). **The glassy state phenomenon in applications for the food industry: Application of the food polymer science approach to structure-function relationships of sucrose in cookie and cracker systems.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 133-176

Reviews the importance of polymer science to food research and development; applications of glassy state phenomenon and glass transitions in food products and processes; the food polymer science approach; glass transition temp. (Tg) and methods of its measurement in foods effect of plasticization on Tg; water dynamics and glass dynamics; Williams-Landel-Ferry Kinetics; state diagrams; effect of mol. wt. on Tg; plasticization by water, structure-function relationships of sucrose in cookie and cracker systems and future prospects of the food polymer science approach. GS

Bread

490

Eggleston (G), Omoaka (PE) and Arowshegbe (AU). **Flour, starch and composite breadmaking quality of various cassava clones.** *Journal of the Science of Food and Agriculture* 62(1); 1993; 49-59

Bread was made using a straight-dough baking process from a local soft wheat flour partially substituted at 4 levels with flour from 9 different cassava (*Manihot esculenta* Crantz) clones. The physicochemical properties of the blended flours, including starch quality, were determined and related to dough rheology, bread vol. and crumb characteristics. Breadmaking quality at substitution levels of 100 and 200 g kg^{-1} of mixed flour was reliably predicted from the cassava flour diastatic activity only. Flours with relatively high diastatic activities, i.e. above -145 mg of maltose, had deleterious breadmaking effects. Baking absorption effects were more critical at substitution levels of 300 and 400 g kg^{-1}. Cassava flour diastatic activity was highly dependent on the moisture contents of the respective tuberous roots, and affected the extent of starch gelatinisation in the breadcrumbs. AA

491

Eggleston (G), Omoaka (PE) and Arowshegbe (AU). **Flour, starch and alternative (wheatless) breadmaking quality of various cassava clones.** *Journal of the Science of Food and Agriculture* 62(1); 1993; 61-66

Alternative (wheatless) cassava breads were made with cassava flour from 8 different cassava (*Manihot esculenta* Crantz) clones fortified with soya flour (200 g kg^{-1} total flour) using margarine and egg white, or xanthan, as additives. In this study, bread specific vol. were reliably predicted from only the diastatic activity and max. paste viscosity of the cassava flour, although further variables still need to be investigated. Flours with diastatic activities above -145 mg of maltose, and indirectly low max. paste viscosities, produced dense, pudding-like structures with completely gelatinised crumbs. The flour diastatic activity was dependent on the moisture content of the freshly harvested tuberous root; above a critical threshold moisture (-75%) content the specific air intake of the loaves decreased sharply. The extent of starch gelatinisation and solubilisation did not critically affect loaf vol. but affected crumb structures. AA

492

Lookhart (GL), Martin (ML), Mosleth (E), Uhlen (AK) and Hoseney (RC). **Comparison of high-molecular-weight subunits of glutenin and baking performance of flours varying in bread-making quality.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 301-306

Baking experiments and analyses of gluten protein composition were carried out with flours from U.S. and Norwegian wheat lines differing in baking characteristics. Bread-making quality was evaluated by mixograph and baking tests. The compositions of high-mol. wt. (HMW) glutenin subunits and gliadins were examined by sodium dodecylsulphate-polyacrylamide gel electrophoresis and acid-polyacrylamide gel electrophoresis, respectively. Lack of correlation between the Glu-1 quality score based on HMW glutenin subunits and baking performance was observed. For the Norwegian wheat lines, variation in gluten polypeptides encoded from the short arm of the IB chromosome partially explained variation in baking performance. AA

Chapathies

493

Sridhar (BS) and Sathyendra Rao (BV). **Optimal design of a rotary cutter by Lagrangian multipliers for the continuous production of Indian unleavened flat bread.** *Journal of Food Process Engineering* 16(2); 1993; 79-92

A mathematical approach for the optimal design of a rotary cutter by using Lagrangian Multipliers, in the continuous production of chapatis (Indian unleavened flat bread), is presented. The objective function has been taken as the output and the constraints have been recognized as diameter and speed of rotation of the roller, number of cutters, diam. of the cutter and gap between the cutters. The numerical profile obtained from the method is in close agreement with the experimental values. It has been observed that, within the range of roller diam. and rotational speeds studied, the roller of diam. 0.165 m with 3 cutters was optimal with an output of 710 units h^{-1}, leaving about 38% scrap dough for recycling. AA

MILK AND DAIRY PRODUCTS

494

Bhattacharya (D), Ray (L), Ghosh (AK) and Chattopadhyay (P). **Activated sludge treatment of dairy waste water - determination of kinetic parameters in continuous stirred tank reactor.** *Research and Industry, India* 39(1); 1994; 43-47

Synthetic dairy waste with av. COD 520 mg/l was treated in a continuous flow stirred tank reactor (30.0 x 30.0 x 30.0 cm^3). Biokinetic parameters determined were as follows: K_s = 93.65 mg/l, q_{max} = 0.199 day^{-1}, Y = 0.75 mg VSS produced/mg substrate consumed K_d = 0.01 day^{-1}, μ_{max} = 0.149 day^{-1}. A max. of 61.5% COD removal was observed at a F/M ratio 0.039. AA

Milk

495

Venkatachalam (N), Mc Mahon (DJ) and Savello (PA). **Role of protein and lactose interactions in the age gelation of ultra-high temperature processed concentrated skim milk.** *Journal of Dairy Science* 76(7); 1993; 1882-1894

Skim milk was pasteurized, filtered, concentrated 3% lactose or 6% sucrose. The 5 samples containing 0.5% lactose, 3 and 6% lactose, 3 and 6% sucrose were UHT processed at 140°C for 4 s in indirect heating, stored in presterilized containers at 4, 20 and 35°C. All samples stored at 4 and 20°C gelled after 21 wk of storage. Samples stored at 35°C did not gel. Samples stored at 4 and 20°C did not appear brown, and browning increased gradually during 35°C storage in samples containing lactose. SDS-PAGE of ungelled samples showed bands due to proteolysis, protein cross linking and streaking pattern. Electron micrograph of gelled samples showed various casein particles connected by hair-like protrusions. The Maillard reaction did not have any effect on age gelation. Protein modifications prevented gelation in samples stored at 35°C. No microbial growth was observed in any samples after 22 wk of storage. SRA

496

Muralidhar (N) and Prasad (MR). **Modification of Richmond formula of ISI lactometer for calculation of SNF of milk containing adulterants and neutralizers.** *Indian Journal of Dairy Science* 46(3); 1993; 132-134

The gravimetric SNF values of pure milk of cow and buffalo and the lactometric values obtained with formula 1 were found to be differing significantly when the readings were taken with the ISI at 25, 27 and 32°C at adulteration level of 15 and 25% with water. The modified formula II was relatively efficient in case of buffalo milk but not with cow milk when compared with gravimetric values. This trend was same for all the milk samples whether adulterated or neutralised. The SNF values of buffalo milk samples with both the formulae with categories of adulteration with water, starch and sugar did not differ significantly. SRA

497

Kamal (NM). **The behaviour of SH-groups during UHT-heating of cow's milk.** *Indian Journal of Dairy Science* 46(3); 1993; 128-131

The changes of SH-groups in milk as a result of forewarming (60-120°C/1-20 min) and ultra high temp. heating (UHT) (120-150/10 sec) were investigated. Results showed that there was a substantial concn. of free SH-groups in raw milk and 75°C was the critical temp. for the first liberation of SH-groups. The heat treatments increased the amount of SH-groups and max. was reached at 95°C/5 min. Above 95°C, a marked decrease occurred. Forewarming (65-95°C) combined with

UHT-heating caused several periodical positive or negative changes in free SH-groups. These phenomena are based on reduction and oxidation of protein disulphide groups during heat treatments, or participation of SH-groups in other reactions which occur in the same time-temp. SRA

498

Patel (DA), Siva (CS) and Sannabhadti (SS). **Sources of microbial contamination of raw milk.** *Indian Journal of Dairy Science* 46(2); 1993; 67-70

Results showed that the differences in microbiological quality of fore and middle milk were found statistically significant in regard to coliforms indicating that fore-milk can be a source of coliforms. Dung and milk can may increase total microbial load and coliforms. Rinsing of milk can with potable water can effectively reduce its microbial load. It is recommended that first 5 streams of milk secretion should be excluded and contamination of raw milk with dung should be avoided by throughly washing the udder and teats before milking and by hygienic handling at the farm. SRA

499

Siva (CV), Patel (DA) and Sannabhadti (SS). **Microbiological status of raw and pasteurized milk.** *Indian Journal of Dairy Science* 46(2); 1993; 62-66

Samples of cow and buffalo raw milk collected from individual producers, collection centres, reception dock of dairy plant and samples of H.T.S.T. pasteurized milk from students training dairy were analysed for microbiological quality. Results indicated that the microbiological quality of raw milk samples were far from satisfactory. The apparent differences in microbiological quality between cow and buffalo milks were found statistically non significant. Microbiological quality of pasteurized milk samples were satisfactory. The high counts in raw milk samples indicate prevailing unhygienic conditions of milk production and handling on the farm and during transportation. SRA

500

Gestrelius (H), Hertz (TG), Nuamu (M), Persson (HW) and Lindstrom (K). **A non-destructive ultrasound method for microbial quality control of aseptically packaged milk.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 334-339

A new method for non-destructive microbial quality control of aseptically packaged milk is proposed. The method is based on acoustic streaming, which is induced by ultrasound in a liquid. Since the streaming is affected by bacterial activity, the spectral content of sound reflected by moving particles in the liquid can be used to assess the microbial status of the product. Experiments were performed on aseptically packaged ultra high temp. milk inoculated with either *Staphylococcus epidermidis* or *Bacillus subtilis* A. The presence of *S. epidermidis* was detected in all packages 5 days after inoculation while the presence of *Bacillus subtilis* A was detected in some of the packages 11 days after inoculation. Although the material in this first study is limited, the method appears promising for microbial quality control of milk as well as other liquid food products. AA

501

Hunter (EA) and Muir (DD). **Sensory properties of fermented milks. Objective reduction of an extensive sensory vocabulary.** *Journal of Sensory Studies* 8(3); 1993; 213-227

Sensory lab. develop vocabularies for new products and even for some old products so that Quantitative Descriptive Profiling can be carried out. It is common to find that the vocabulary developed is too extensive to be used on a routine basis. One method of reduction is to use statistical methods to identify sub-sets of descriptors. This paper describes how these methods have been used in the development of a vocabulary for fermented milks. Sub-sets of the vocabulary were found, using the communalities form the principal component analyses, and these were verified to cover the sensory space by Procrustes Rotation. A confirmatory experiment was carried out using the reduced vocabulary. A Procrustes Rotation of the scores derived from the separate analysis of these experiments verified that they were in excellent agreement. AA

502

Mukherjee (D), Bandyopadhyay (AK) and Ghatak (PK). **Some factors affecting heat stability of goat milk.** *Indian Journal of Dairy Science* 46(7); 1993; 307-310

The effect of different parameters such as species, chemical and physical attributes, and pH on the heat stability (HS) of goat milk were studied and compared with cow and buffalo milk. Heat coagulation time (HCT) of goat milk sample varied from 14.16 - 24.5 min with an average of 18.76 plus or minus 3.12 min. In buffalo milk it was 17.20 plus or minus 4.03 min and cow milk 19.88 plus or minus 3.68 min. Significant correlation ($r = 0.8921$) was observed between HS an NPN content of goat milk. Acidity (lactic acid%), viscosity and surface tension were found significantly correlated with HS. Goat milk exhibited max. HS in HCT pH profile at pH 6.7, 130 and 140°C. Reduction of TS caused significant increase in HCT throughout pH range studied. Addition of 2-deoxyribose (50 mg/100 ml) and urea (30 mg/100 ml) increased the HS at all pH values studied. SRA

Milk products

503

Diaz (S), Moreno (MA), Dominquez (L), Suarez (G) and Blanco (JL). **Application of a diphasic dialysis technique to the extraction of aflatoxins in dairy products.** *Journal of Dairy Science* 76(7); 1993; 1845-1849

A simple, sensitive, very economical and efficient method for the extraction of aflatoxins from milk and milk products based on a diphasic dialysis technique, followed by detection and quantification of aflatoxins by TLC. Recovery was 65 to 99% for aflatoxins B_1, G_1 and M_1 and the detection limit in milk and yoghurt was 0.01 to 0.02 p.p.b. for all aflatoxins studied. In cheese, the detection limit was 0.03 to 0.04 p.p.b. for aflatoxins B_1 and G_1 and 0.1 p.p.b. for aflatoxin M_1. BV

504

Adhikari (AK), Mathur (ON) and Patil (GR). **Heat induced changes in the protein fractions of acid and heat coagulated indigenous milk products during processing: SDS page study.** *Indian Journal of Dairy Science* 46(7); 1993; 321-325

SDS-PAGE analysis of the protein fractions of *Chhana*, *Khoa*, *rasogolla* and *gulabjamun* made from cow, buffalo and mixed milks was carried out to study the relative heat induced changes that occur duirng processing. *Chhana* obtianed by lactic or citric acid coagulation at pH5.4 or at 5.6 had two casein fractions as α_s- and β-while one sub-fraction of β-casein was noticed in *chhana* coagulated by lactic acid at pH 5.4. Buffalo milk *chhana* obtained by lactic acid coagulation and mixed *chhana* by citric acid coagulation at pH 5.4 and at 85°C had slightly different electrophoretic mobilities. *Rasogolla* made from citric aci coagulated *chhana* exhibited only α_s- and β-fractions having similar mobilities in all the 3 samples, whereas *rasogolla* made from lactic acid coagulated *chhana* had slightly faster mobilities with one heat degraded fraction of β-casein in between. *Khgoa* had a single-broad band in all the 3 samples made from cow, buffalo and mixed milks, which split into 2 fractions with some unclear and diffused zones in between then as *khoa* was processed to *g;uabjamun*. However, addition of sodium citrate prior to *gulabjamun* preparation resulted only in a single but sharp band witn no unclear zone in all the 3 samples. No trace of K-casein was found in the electrophorogram in any of the products studied. AA

Butter

505

Schieberle (P), Gassenmeier (K), Guth (H), Sen (A) and Grosch (W). **Character impact odour compounds of different kinds of butter.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 347-356

Sensory evaluation of 5 different kinds of butter revealed an Irish sour cream butter (ISC) and a farmer sour cream butter (FSC) with the highest overall odour intensities. 19 odour-active compounds were detected by aroma extract dilution analysis in a distillate of the ISC butter. The highest flavour dilution

(FD)-factors were found for δ-decalactone, skatole, [Z]-6-dodeceno-γ-lactone and diacetyl followed by [E]-2-nonenal, [Z,Z]-3,6-nonadienal, [Z]-2-nonenal and 1-octen-3-one. Odour activity values (OAV; ratio of concn. of odour threshold) were calculated from quantitative data determined by means of stable isotope dilution assays and from odour thresholds in oil. Diacetyl followed by δ-decalactone and butanoic acid showed the highest OAVs in the ISC butter and a cultured butter with creamy, sweet odours. In contrast, a sweaty, rancid odour predominated in the FSC butter in which butanoic acid showed the highest OAV. The odour of of a mixture of diacetyl (0.34 mg/kg), δ-decalactone (4.9 mg/kg) and butanoic acid (3.6 mg/kg) in sunflower oil was in a very good agreement with the odour of the cultured butter containing the same amounts of these odorants. The data suggest that the 3 odorants should be useful as indicators for the objective assessment of the buttery odour note in milkfat-containing products. AA

Cheese

506

Kok (J). **Genetics of proteolytic enzymes of lactococci and their role in cheese flavour development.** *Journal of Dairy Science* 76(7); 1993; 2056-2064

This paper summerizes the data obtained in the last 5 yr of intensive research by various research groups operative in this field. The emphasis is on proteinase and peptidase enzymes and their genes and on the manipulation of proteolytic capacity of the bacteria by genetic techniques. The prospect of such genetically engineered strains in cheese fermentation and the first results in this area are discussed. The aspects included are the cell envelop-associated proteinase (lactococci contain one cell envelop-associated proteinase, similarities of lactococci proteinase and subtilisins, lactococcal proteinase maturation: an autoproteolytic process, genetic manipulation of proteinase specificity, *Bacillus subtillis* neutral proteinase gene expression in *Lactococcus lactis*, insertion of prt gene in the chromosome of *L. lactis*, peptidases (petidase purification, peptidase localization, nucleotides, codons and amino acids, peptidase mutants and their performance in cheese making. 56 references. SRA

507

Oner (MD) and Akar (B). **Separation of the proteolytic enzymes from fig tree latex and its utilization in Gaziantep cheese production.** *Lebensmittel-Wissenschaft und -Technologie* 26(4); 1993; 318-321

In this study ammonium sulphate fractionation, gel filtration and ion-exchange chromatography methods were applied to separate proteolytic enzymes from the milk clotting enzyme of fig tree latex. The active fractions were determined by measuring milk-clotting activity and casein splitting activity. Reconstituted skim milk powder and α-casein were used as substrates. A broad peak which has a max. milk-clotting to casein-splitting ratios of 4.89 was obtained. Several active fractions were obtained by ion-exchange chromatography which had high milk clotting to casein splitting ratios: 4.02:1, 3.78:1, 3.76:1, 4.00:1 and 3.57:1 respectively. The suitability of milk-clotting enzymes from fig latex for the production of Gaziantep cheese was tested. Comparative lab. tests of cheese-making show similarities between calf rennet and enzymes obtained by ion-exchange chromatography. The results of triangle tests indicated that the difference between Gaziantep cheese made with rennet and enzyme preparation obtained from ion-exchange chromatography, was not significant ($P < 0.05$). Organoleptic tests showed that there was no significant difference in acidity, bitterness, creaminess, off-flavour and graininess with the LSD method ($P < 0.05$). It was concluded that fig tree latex is suitable as a chymosin substitute, and could be used in Gaziantep cheese production. AA

Camembert cheese

508

Nakazawa (Y), Yamada (M), Michishita (J), Nakazawa (S) and Tsukasaki (F). **Changes in rheological properties during ripening of camembert cheese.** *Indian Journal of Dairy Science* 46(7); 1993; 311-316

The initial colloidal/souble ratio of Ca in cheese milk was 4.74 and initial Ca/protein ratio in cheese milk was 0.035. Increase in ripening period resulted in increase of consistency index and decrease in hardness and breaking stress. Breaking strength had a similar change compared to the yielding point. Brittleness and gelation strength was affected by the growth of mould. Thgese parameters showed lowering curd firmness, brittleness, elasticty and hardness. Mg and Ca retained in cheese was 62 and 90% respectivley. The Ca fortification by adding $CaCl_2$ indicated that binding of Ca to protein was essential and affected the quality of cheese texture. The Ca/protein ratio in cheese texture was 0.037. Cheese ripened at 28 - 35 days were rated excellent (score 5). Cheese ripened at 42 days were baking in colour and lustor. SRA

Cheddar cheese

509

Roberts (RF) and Zottola (EA). **Shelf-life of pasteurized process cheese spreads made from Cheddar cheese manufactured with a nisin-producing starter culture.** *Journal of Dairy Science* 76(7); 1993; 1829-1836

Cheddar cheese made with a nisin producing starter culture and commercially available starter culture were used to manufacture pasteurized process cheese spreads at 53 and 60% moisture respectively. Composition did not differ between spreads of similar moisture content with and without nisin. The nisin contents of cheese spreads were 301 and 387 IU/g at the high and low moisture % respectively. Pasteurized process cheese spreads with nisin incubated with spores of *Clostridium sporogenes* PA3679 showed extended shelf-life compared with that of cheese spreads without nisin of similar moisture. Shelf-life extension was much greater at 53% moisture than at 60%. SRA

510

Kumar (V) and Tewari (BD). **Effect of processing variables on physico-chemical properties of cheese powder from accelerated ripened Cheddar cheese.** *Indian Journal of Dairy Science* 46(2); 1993; 56-61

Results revealed that the physical quality of cheese powder improved with the increasing total solids of slurry. Addition of trisodium citrate at the rate of 3.0% was considered to be the best for manufacturing cheese powder from accelerated ripened cheese. SRA

Cottage cheese

511

Bautista (DA), Durisin (MD), Razavi-Rohani (SM), Hill (AR) and Griffiths (MW). **Extending the shelf-life of cottage cheese using monolaurin.** *Food Research International* 26(3); 1993; 203-208

The level of inhibition of monolaurin in raw milk was determined and its functional applications in cottage cheese (CC) was ascertained. Incorporation of monolaurin into naturally contaminated cottage cheese at levels of 250 and 500 p.p.m. resulted in > 90% inhibition of both *Pseudomonas* spp. and coliforms during 7 days of storage at 6, 15 and 21°C. There was also > 90% inhibition of yeast and mould growth under the same storage conditions in the presence of monolaurin. Results suggest that monolaurin as an emulsifying agent has beneficial effect in extending the shelf-life of CC (approx. 5-10 days) when assessed by organoleptic analysis. GS

Mozzarella cheese

512

Kindstedt (PS). **Effect of manufacturing factors, composition and proteolysis on the functional characteristics of Mozzarella cheese.** *CRC Critical Reviews in Food Science and Nutrition* 33(2); 1993; 167-187

Review covers manufacturing factors that influence composition and proteolysis of Mozzarella cheese (milk standardization, starter culture, coagulant, cooking, draining, stretching, brining/salting), functional characteristics (functional characteristics of unmelted Mozzarella, melted Mozzarella), effect of composition and proteolysis on functional characteristics (effect on unmelted and melted Mozzarella). 71 references. SRA

Dahi

513

Sharma (NK), Gill (JPS), Joshi (DV) and Kwatra (MS). **Mycoflora of Indian fermented milk product (*Dahi*).** *Indian Journal of Dairy Science* 46(2); 1993; 85-87

Analysis of 106 samples of *Dahi* revealed yeast counts of log 2/g or higher in 40.5% and mould counts of log 1/g or higher in 48.1% of total samples. The isolates belonged to 7 genera *Saccharomyces*, *Torulopsis*, *Trichosporon*, *Aspergillus*, *Pencillium* *Mucor* and *Fusarium*. Eight (7.5%) samples showed the presence of *Asp. flavus*. BV

Rasogolla

514

Desai (HK), Gupta (SK), Patel (AA) and Patil (GR). **Texture of *rasogolla*: Effect of composition and variety in market samples.** *Indian Journal of Dairy Science* 46(3); 1993; 123-127

Three common var. of *rasogolla* were evaluated for chemical composition and texture by sensory and instrumental means. The moisture $P < 0.01$), protein ($P < 0.05$) and carbohydrates ($P < 0.01$) varied significantly between sources. Sponge *rasogolla* of normal size (SN) contained significantly higher ($P < 0.01$) fat and protein contents and significantly higher ($P < 0.05$) and carbohydrate ($P < 0.01$) contents than those of ordinary small size (OS) and ordinary normal (ON) size *rasogolla*. SN var. was characterised by high sensory elasticity, springiness ($P < 0.01$) and juiciness and low stickiness. SRA

Wheys

515

Morr (CV) and Ha (EYW). **Whey protein concentrates and isolates: Processing and functional properties.** *CRC Critical Reviews in Food Science and Nutrition* 33(6); 1993; 431-476

This review covers, background information [current whey and whey protein (WP) production, whey composition and processing, WP concentrate (WPC) and WP isolate (WPI) composition and functionality, mechanism of protein functionality, WPC functionality, basic properties of WP (β-lactoglobulin, α-lactalbumin, bovine serum albumin, immunoglobulins, β-casein fragments, membrane protein and lipids, other minor whey proteins, heat-induced WP denaturation and interaction, heat-induced WP lactose interaction), principles of functionality (solubility, heat-induced gelation, surface properties, colour and flavour)], factors affecting functionality [composition, (gelation, surface properties), hydrophobicity, protein structure, processing (heat treatments, whey pretreatment, membrane technology and storage)]. 248 references. SRA

Milk proteins

516

Chen (J) and Dickinson (E). **Time-dependent competitive adsorption of milk proteins and surfactants in oil-in-water emulsions.** *Journal of the Science of Food and Agriculture* 62(3); 1993; 238-289

Competitive adsorption of pure milk proteins and non-ionic surfactants has been studied in model oil-in-water emulsions (4 g kg^{-1} β-lactoglobulin or β-casein, 200 g kg^{-1} n-hexadecane) as a function of the age of the absorbed protein layer at the oil-water interface. With β-lactoglobulin-stabilised emulsions containing oil-soluble surfactant $C_{12}E_2$ (diethylene glycol n-dodecyl ether), there is found to be a steadily increasing amount of protein associated with the emulsion droplets over a few hours following emulsification. Addition of water-soluble surfactant Tween 20 (polyoxyethylene (20) sorbitan monolaurate) to a β-lactoglobulin-stabilised emulsion (with or without $C_{12}E_2$) leads to less protein displacement if the emulsion is aged prior to addition of Tween 20. Moderate additions of $C_{12}E_2$ or Tween 20 produce no time dependence in the competitive adsorption in β-casein-stabilised emulsions, although some time dependence is observed when $C_{12}E_2$ and a high concn. of Tween 20 are present together. Crystallisation of the oil phase in β-casein-stabilised emulsions at pH 7 leads to a lowering of the measured protein surface concn., especially in the presence of $C_{12}E_2$, and a reduction in the surfactant to protein molar ratio required for complete protein displacement by water-soluble surfactant (Tween 20 or octaethylene glycol n-dodecyl ether). Under more acidic conditions of pH 5 or pH 3, the surface coverage and ease of displacement of β-lactoglobulin at the surface of liquid emulsion droplets is substantially different from that under neutral pH conditions. AA

517

Silvestre (MPC), Lati (E), Dauphin (C) and Hamon (M). **Cuprimetric assay of casein hydrolysates.** *Journal of AOAC International* 76(6); 1993; 1295-1299

Reports a simple, reproducible and precise potentiometric assay (copper indicator electrode) developed for alkalinized sol. of pure casein hydrolysates, with or without additional amino acids, carbohydrates, or lipids (short chain tryglycerides; SCT) using a titrated Cu (II) sulphate sol. The Cu consumption is related to both free amino acid and peptide contents. Thus, in comparison with the α-amino N detn., the method gives better information about the composition of protein hydrolysates. BV

518

Fox (PF) and Mulvihill (DM). **Developments in milk protein processing.** *Food Science and Technology Today* 7(3); 1993; 152-161

Reviews the new developments in the processing of milk proteins. Aspects covered include: milk protein system; developments in casein production; production of 'native' casein; fractionation of casein; whey proteins and whole whey protein products; fractionation of whey proteins; biologically active proteins (lactoperoxidase, lactotransferrin, and immunoglobulins); chemically, physically and enzymatically modified milk proteins, milk protein hydrolysates; caseino-phosphopeptides and caseinomorphines. 52 references. GS

519

Varindra, Singh (S) and Sood (SM). **Effect of some elements on opacity of casin micelles from buffalo milk.** *Indian Journal of Dairy Science* 46(7); 1993; 317-320

Effect of addition of Ca, P, citrate and NaCl at different temp. and pH values on the opacity of casein micelles sol. was investigated. When Ca (1.40 mM) alone was added, there was a drastic increase mainly through hydrophobic interactions and reduction in electrostatic repulsion by Ca binding. Addition of P (1.35 mM) to sol. already containing Ca further increased the opacity probably due to salt bridges which were readily formed in casein molecules. Addition of citrate did not effect the opacity much. Increase in the temp. of these sol. from 10 to 40°C increased their opacity. Increase in pH values of these sol. from 6 to 10, however, decreased their opacity. Addition of NaCl at 35 mM concn. to casein sol. increased the opacity probably due to casein polymerization. Higher concn. of NaCl, however, resulted in lesser increase in opacity values. The casein micelle sol. prepared from acid precipitated as well as first cycle casein showed similar results. AA

MEAT AND POULTRY

Meat

520

Radomyski (T), Murano (EA) and Olson (DG). **Irradiation of meat and meat products to ensure hygienic quality.** *Dairy, Food and Environmental Sanitation* 13(7); 1993; 398-403

In this review, the results of exp. from recently published papers on irradiation of meat and meat products, and future of irradiation technology are discussed. Aspects covered include, inactivation of meat-borne parasites of man, elimination of bacterial pathogenes from fresh and processed meat and poultry. 40 references. SRA

521

Chambers (EIV) and Bowers (JR). **Consumer perception of sensory qualities in muscle**

foods. *Food Technology* 47(11); 1993; 116, 118-120

The influence of the sensory characteristics of meat on the decisions of the consumers on safety, healthfulness, quality, value and sensory acceptance is discussed in this article. CSA

522

Bett (KL). **Measuring sensory properties of meat in the laboratory.** *Food Technology* 47(11); 1993; 121-122, 124-126, 134

A brief description on the sensory analysis and its application to flavour and texture of beef, lamb, pork, poultry and fish is given in this article. It also describes the sensory aroma/gas chromatographic approaches. CSA

523

Kauffman (RG). **Opportunities for the meat industry in consumer satisfication.** *Food Technology* 47(11); 1993; 132-134

The marbling paradox, colour, firmness and water capacity, fortification, prevention of cold shortening and nutritional merits are different issues described in this article which will provide new perspectives in which the meat industry can contemplate to fulfil the consumer needs. CSA

Beef

524

Carlez (A), Rosec (J-P), Richard (N) and Cheftel (J-C). **High pressure inactivation of *Citrobacter freundii*, *Pseudomonas fluorescens* and *Listeria innocua* in inoculated minced beef muscle.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 357-363

525

Bruggen (K), Mckeith (FK) and Brewer (MS). **Effect of enzymatic tenderization, blade tenderization or precooking on sensory and processing characteristics of beef bacon.** *Journal of Food Quality* 16(3); 1993; 209-221

526

Huskey (LL), Brown (HG), Lewis (PKJr), Brown (AHJr), Johnson (ZB), Perkins (AH). **Effect of end-point temperature and fat level on the residual cholesterol in ground beef patties.** *Journal of Food Quality* 16(3); 1993; 187-196

527

Gustavsson (P) and Borch (E). **Contamination of beef carcasses by psychrotrophic *Pseudomonas* and *Enterobactriaceae* at different stages along the processing line.** *International Journal of Food Microbiology* 20(2); 1993; 67-83

Two methods were compared for the estimation of bacterial contamination of beef carcasses and for the detn. of critical stages during processing. Detn. of the initial viable counts on beef carcasses was compared with new method (the contamination index CI). This method enabled the detection of differences in the contamination levels of spoilage bacteria, between the processing stages which are not detected by the aerobic counts on carcasses. The CI was based on the sum of the bacterial numbers of aerobic bacteria and *Enterobactriaceae* from analysis after 0, 7 and 14 days of storage at 4°C instead of 0, 3, 7 and 14 days at 2°C. This technique has been used for estimating the potential proliferation of *Escherichia coli* during the carcass cooling process. SRA

Products

Meat

528

Gordon (A). **Studying comminuted meat products using corroborative techniques.** *Food Research International* 26(3); 1993; 209-216

The major techniques employed to study comminuted meat systems and the use of new methodologies and techniques and their adaptability for use in the meat industry are reviewed. The combined use of differential scanning calorimetry, rheological scanning, texture profile analysis, microscopial techniques and protein extraction techniques are recommended for the study of comminuted meat products. 83 references. GS

529

Munoz (AM) and Chambers (EIV). **Relating sensory measurments to consumer acceptance of meat products.** *Food Technology* 47(11); 1993; 128-131, 134

The article discusses the value of relating sensory properties measured by a trained descriptive panel to consumer acceptance and consumer information, the approaches (sequential approach, similtaneous approach, optimization study, category review) used to conduct such studies, the techniques (univariate and multivariate techniques) or statistical analyses used and the results of the case study done to illustrate the above points. The discussion focuses on meat products but the methodology is applicable to all commodities and consumer products. CSA

Poultry

530

Pszczola (D). **Irradiated poultry makes US debut in Midwest and Florida markets.** *Food Technology* 47(11); 1993; 89-92, 94, 96

The article describes the marketing experiences of 4 stores selling irradiated chicken in the US. It also covers the processing and distribution of the poultry products; the Midwest and Florida markets selling the product and their similarities and differences; and the future markets for irradiated poultry. CSA

Chickens

531

Awonorin (SO). **Quality of smoked chicken - Guinea-fowl sausage as affected by processing condition and cold storage.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 285-290

The effects of smokehouse temp. and humidity, and cold storage on organoleptic characteristics and certain quality parameters of smoked sausage manufactured using a mixture of 60% guinea-fowl meat and 40% broiler chicken were studied. The mechanical properties of samples (shear force, hardness, cohesiveness, springiness and chewiness), water-holding capacity and homogenate stability were significantly affected by the processing conditions used and period of cold storage. High tenderness, juiciness and acceptability were associated with samples processed using low-smokehouse temp. (80°C) or high RH (85%). Shear values were linearly related to tenderness scores with high regression coefficient, thus, making it possible to predict a range of shear values required for satisfactory tenderness for sausage production. The peroxide value and thiobarbituric acid values increased during cold storage, however, sensory evaluation results showed that the refrigerated samples were still acceptable at the end of 8 wks, but with reduced scores. AA

532

Awonorin (SO). **Rheological and mechanical properties, B-vitamin retention and sensory characteristics of smoked sausage made from mixtures of broiler chicken and Guinea fowl.** *Lebensmittel-Wissenschaft und - Technologie* 26(4); 1993; 291-300

The study was conducted to determine the effects of varying the amounts of guinea fowl and broiler chicken on the proximate composition, retention of some B-vitamins, emulsion, rheological and sensory characteristics of fresh and frozen smoked sausages. The conclusions were: (1) proximate composition of the sausage emulsions of all samples were generally the same; (2) all the sausage formulations exhibited a Bingham pseudoplastic behaviour with yield stresses; (3) nutritionally, sausage formulations containing more guinea fowl had higher thiamin, riboflavin and niacin contents; (4) cooking losses were higher in samples containing more broiler chicken, hence, resulting in decreased retention of the B-vitamins in the freshly cooked sausages; (5) retention of thiamin and riboflavin increased slightly during cold storage while niacin decreased; (6) compressive and penetration stresses, hardness and cohesiveness decreased with cold storage or as the proportion of guinea fowl in the formulation decreased; (7) emulsification capacity and amount of fat recovered increased while the solids and gel liquid recovered decreased with increasing proportion of broiler chicken; and (8) both the trained and consumer panelists preferred sausages containing 50% or more of guinea fowl. AA

Broilers

533

Sachdev (AK) and Verma (SS). **Effect of processing on moisture of broiler meat.** *Beverage and Food World* 20(3); 1993; 23-24

This review deals with the effect of various types of processing (physical, chemical treatments and thermal processing) on microstructure and some of the acceptability traits of broiler meat. Reference is also made of similar kinds of studies in other species. 18 references. SRA

Turkeys

534

Berwal (JS) and Sahoo (J). **Effect of levels of skin and fat on the acceptability of turkey sausage.** *Indian Journal of Poultry Science* 28(3); 1993; 265-267

18 month old adult turkey hen carcasses were hot deboned. Lean meat and turkey skin and fat (TSF) were separately packed and chilled at 4 plus or minus 1°C for 24 h. The fresh chilled deboned turkey meat (DTM) and TSF were comminuted separately. TSF was incorporated at three levels 15, 20 and 25% to DTM in sausage formulations T_1, T_2 and T_3. Sodium caseinate (2%), sodium chloride (2%), tetrasodium pyrophosphate (0.3%), sodium nitrite (0.012%), cane sugar (0.4%), L-ascorbic acid (0.08%), raw garlic (0.1%) and ice (20%) were added to the meat mix. Dry spice mix containing red pepper (0.5%), black pepper (0.5%) and cardamom (0.1%) were added. Sausage batter so formed was stuffed into natural casings of about 20 mm diam. and cooked for 20 min to an internal temp. of 70°C. The cooked sausages were stored at 4 plus or minus 1°C for 12 h. T_1 (15% TSF) sausages scored the highest for appearance and flavour. The mean scores of tenderness, juiciness and acceptability were the highest for T_2 (20% TSF). GS

Products

Poultry

535

Murugkar (HV), Sherikar (AT) and Tarwate (BG). **Studies on the microbial isolates of poultry products.** *Indian Journal of Poultry Science* 28(3); 1993; 233-237

108 samples, comprising 18 samples each of whole dressed chicken, boneless legs, boneless breast, liver, gizzard and kheema were analysed for their total viable count (TVC) and differential counts. Majority of the products had the TVC in the range of 4 to 7 log CFU/g. The liver had the highest mean TVC of 6.91 log CFU/g whereas the whole chicken yielded the lowest counts of 5.57 log CFU/g. Fairly high counts of various bacterial isolates which belonged to potential pathogenic and spoilage types were also recovered. AA

Eggs

536

Pandey (NK), Anand (SK), Ram Gopal and Verma (SS). **Peeling characteristics and quality of hard cooked eggs as related to strain, breed and age of egg.** *Indian Journal of Poultry Science* 28(3); 1993; 238-246

Eggs from 9 strains (5 layer and 4 broiler) of chicken at 0, 7 and 14 days of ambient (24.7 - 27.5°C) and refrigerated (5°C) storage were studied. Variation among strains for ease of peeling and peeled surface appearance was observed only in fresh hard cooked eggs. Peeling characteristics was significantly affected by the age of egg with excellent peelability in stored ones. Aging at ambient temp. hastened the peelability over that at refrigeration temp. Albumen pH decreased, whereas yolk pH increased after hard cooking. Moisture of albumen decreased upon cooking in fresh and stored eggs. Significant differences for albumen and yolk texture were detected during storage in most of the strains. Albumen of fresh hard cooked egg was hard, elastic and deformable and its texture improved with aging. Fresh hard cooked egg had more egg odour than the stored egg. Cooked eggs from light breed had more egg odour than eggs from heavy breed. GS

537

Anand (SK), Harpreet Singh and Pal (SK). **Level of bacterial load on guinea fowl egg shell and internal contents.** *Indian Journal of Poultry Science* 28(3); 1993; 259-261

Cage laid eggs had a higher hygeinic quality and lower percent of dirty eggs than floor eggs. The mean bacterial counts on shell of floor eggs (18.6×10^2) was significantly higher than the cage eggs (12.9×10^2), but the bacterial counts in egg contents were comparable (5.7×10^1g). The thickness of the egg shell averaged 0.48 mm which was much higher than that of chicken egg shell. The antimicrobial defence efficacy of eggs was attributed not only to shell quality and shell membranes, but also to egg white protein components like lysozyme, avidin and conalbumin. GS

538

Dall (JS). **How nutritious is an egg ?.** *Poultry Guide* 31(3); 1994; 37-39

Egg contains protein 12.5%, lipid 11.8%, carbohydrate 0.4%, inorganic elements 0.8%, water 74.5% and egg yolk, all important vitamins, minerals, fats and amino acids. Hence its daily consumption as dry eggs, poached eggs, omelettes (pancakes), custard, puddings, cream pies, ice creams, cakes, sandwiches, pakora, boiled, half-boiled and half-fried are recommended. GS

539

Sharma (V). **Break-even analysis of egg production in Punjab.** *Poultry Guide* 31(4); 1994; 43-44

145 poultry farms in Ludhiana district and 60 in Faridkot district, Punjab, India were surveyed and found that the min. level of production of eggs required to recover the total fixed investment employed in an average poultry farm was 2.64 and 2.93 yr for Ludhiana and Faridkot districts respectively. Large size farms were able to recover it earlier than small and medium size farms. GS

Pickles

540

Kulshrestha (SB), Kapoor (KN), Sachdev (AK) and Verma (SS). **Microbiological evaluation of gizzard pickle at various stages of preparation.** *Beverage and Food World* 20(5); 1993; 15, 17

This paper presents microbial loads along with pathogens screened in the ingredients used for processing oil based and vinegar based gizzard pickle, for ensuring safety to consumers. The samples of raw gizzards showed high microbial counts and various pathogens. The cooked gizzards (15 lb for 10 min) did not show count of viable bacteria. The ingredients (salt, garlic, ginger, mustard oil and vinegar) had no viable counts. Turmeric had few yeast and moulds. Processed gizzards of both the type showed no pathogens and total plate counts. SRA

SEAFOODS

541

Swamy (PK). **Incentives for export of marine products.** *Seafood Export Journal* 25(10); 1993; 25-42

Describes the different incentives, assistance and facilities given by government organisations like Marine Products Export Development Authority (MPEDA) for the export of marine products. GS

542

Balakrishnan (S). **Building a 'system castle'.** *Seafood Export Journal* 25(10); 1993; 11-22

Orients Indian fish processing industries to the various measures taken by the government in promoting them and encouraging them to be receptive and to make use of the opportunities available. Also the method, cost and benefits of ISO-9000 registration are explained. GS

543

Taliat (J). **General constraints in maintenance of quality in Indian seafood**

industry in light of HACCP system. *Seafood Export Journal* 25(10); 1993; 5, 7, 9-10

Hazard analysis and critical control point (HACCP) system for maintenance of quality in the seafood processing industry is described. The origin, concepts of HACCP and its application to handling and storage of fishing vessels, auctioning, preprocessing, processing plants, shipment and their associated limitations are discussed. GS

544

Lima dos Santos (CA), Josupeit (H) and Chimisso dos Santos (D). **EEC quality in health requirements and seafood exports from developing countries.** *Seafood Export Journal* 25(13); 1994; 29-40

The status of seafood industry and their export market in developing coutries; the remedial measures for trade problems such as government drafting standards based on buyers specifications; the positive role of FAO, CIDA, DANIDA, ODA and other aid organisations in the improvement of fish inspection and quality control; lack of trained personnel, financial resources, communication, clear instructions which affect the export of seafood products in developing countries are discussed. GS

545

Sherief (PM) and Krishnakumar (S). **Phosphates in seafood processing.** *Seafood Export Journal* 25(13); 1994; 19, 21, 23, 25, 28

Summarizes the classification and characteristics of food phosphates like sodium acid pyrophosphate, tetrasodium pyrophosphate, sodium tripolyphosphate and sodium hexametaphosphate; their chemical characteristics, toxic limits; acceptable daily intake; application in seafood products, merits of using phosphates as food additives in preserving colour, improving tenderness, binding, moisture retention and flavour; and demerits such as upgradation of lower grade food products and increase of water content food products causing restrictive trade practice in wt. and measures. GS

Oysters

546

Sugumar (G), Jeyasekaran (G) and Jeyachandran (P). **Pickles from edible oyster (*Crassostrea madrasensis*) meat.** *Fishery Technology* 31(1); 1994; 72-74

Two pickle recipes were formulated from edible oyster (*C. madrasensis*) meat with a conventional hot spicy, sweet and sour taste. A gradual reduction of pH was observed in the initial stages, which stabilized around 4.2 after 2 months in both pickles. Bacterial population increased during later stages of storage. Coliforms were totally absent throughout the storage, and moulds appeared after 150 days of storage. Pickles had the shelf-life of about 6 months and were acceptable. SRA

Prawns

547

Abraham (TJ) and Rudra Setty (TM). **Effect of sodium benzoate on the fermentative activity of *Lactobacillus plantarum* in fermented prawn pickle.** *Fishery Technology* 31(1); 1994; 48-51

The study indicated that *Lact. plantarum* survived and grew in heavily spiced, salted prawn pickle. Sodium benzoate (0.1%) showed an inhibitory action on the growth of lactic acid bacteria, acid production and pH reduction. SRA

Shrimps

548

Gopalakrishna Iyer (TS) and Shrivastava (KP). **Antogonistic actions of *Escherichia coli*, faecal streptococci and natural bacterial flora on *Staphylococcus aureus* in shrimp homogenate.** *Fishery Technology* 31(1); 1994; 41-47

The inter competition between coagulase positive staphylococci and *Escherichia coli* for growth in shrimp homogenate at 28, 10 and 0^{o}C was studied. Staphylococci could not grow in competition with *E. coli*, faecal streptococci and natural bacterial flora at any of the temp. studied. SRA

Fish

549

Ammu (K), Stephen (J) and Devadasan (K). **Retention of amino acids in the carcass of fish protein fed rats.** *Fishery Technology* 31(1); 1994; 29-35

Retention of individual amino acids essential (2.7%) and non-essential (2.3%), in the carcass of albino rats fed fish proteins as the sole source of dietary protein at 5, 10, 15, 20 and 25% levels for a 3 wk period was studied. Amino acids supplied by the protein above 20% level was in excess of the requirements for the synthesis of body protein. The PER showed max. value at 10% protein in the diet. SRA

550

Unnikrishnan Nair (TS), Mathen (C) and Ravindranathan Nair (P). **Control of insect infestation in dry fish by pyrethrum treatment on commercial containers.** *Fishery Technology* 31(1); 1994; 64-68

Three pyrethrum formulations, pyrocon E1:10, pyrethrum EC and pyrocolloid were sprayed at 0.0156-0.25% concn. on gunny bags. Control and treated dry fish were packed in treated and untreated gunny bags and observed at regular intervals. This treatment prevented insect infestation in commercial dry fish for 3 months whereas control samples got infested within a month. SRA

551

Ravindranathan Nair (P), Unnikrishnan Nair (TS), Joseph (KG) and Mathen (C). **Amenability of *Euthynnus affinis* to preparation of masmin - like products by a modified process.** *Fishery Technology* 31(1); 1994; 69-71

Euthynnus affinis has been processed to products resembling masmin and masmin flakes by cooking the dressed and brined fish under steam pressure followed by cooling, separation and the fillets (shredding for flakes) and alternate drying and smoking. The process yielded 4% more product than the traditional method. Preparation of masmin flakes can be achieved in 3 days compared to 10 days for masmin production. Both masmin and masmin flakes from *E. affinis* were graded asvery good and palatable. The water soluble protein and non-protein nitrogen were higher in the product prepared by the modified process. AA

552

Prasad (MM), Panduranga Rao (CC) and Gupta (SS). **Chemical and microbiological quality of dry fish from Kakinada.** *Fishery Technology* 31(1); 1994; 75-78

75 market samples of cured/dried fish belonging to 24 var. were analysed for bacterial counts and coliforms. 32.4% of dry fish had < 40% moisture, < 20% salt. Total bacterial counts ranged from 10^3 to 10^6/g of the samples. Coliforms were present in 17 samples, *E. coli* in 6 samples, faecal streptococci in 5 samples and coagulase positive staphylococci in 2 samples. SRA

Anchovies

553

Alur (MD), Warrier (SB), Vinh (PQ) and Nair (PM). **A biochemical method to identify irradiated semi-dried anchovies *Stolephorus commersonii*.** *Fishery Technology* 31(1); 1994; 25-28

Gamma-irradiated (5 kGy) semi-dried anchovies (*S. commersonii*) along with unirradiated samples stored at room temp. for a period of 2 and 5 months were subjected to microbiological analysis to examine spoilage indices such as total volatile acids (TVA) and total volatile base nitrogen (TVBN) after inoculation of the fish homogenates with natural microflora, *Aeromonas hydrophila*, *Bacillus megaterium*, *Pseudomonas marinoglutinosa* and *Salmonella typhimurium*. The incubation period for detn. of TVA and TVBN was 18 h at 37°C. Prolonged storage resulted in an increase in TVBN formation by 100 mg% in non-irradiated semi-dried fish irrespective of the type of organisms inoculated. TVA did not change in both non-irradiated and irradiated samples after prolonged storage. Formation of volatile acids and bases was reduced by 4-fold in irradiated samples. SRA

Mackerels

554

Sebedio (JL), Ratnayake (WMN), Ackman (RG) and Prevost (J). **Stability of polyunsaturated ω-3 fatty acids during deep fat frying of Atlantic mackerel (*Scomber scomberus* L.).** *Food Research International* 26(3); 1993; 163-172

Atlantic mackerel steak sections were deep fat fried for 7 min in canola oil at 180°C. The longer-chain ω-3 pufa content of the mackerel was not affected by deep frying. Only small quantities of polar components, polymers and geometrical fatty acid (FA) isomers of the long chain highly pufas were formed during deep fat frying. Examination of the FA composition of the frying medium, the fish skin, and the meat showed extensive lipid exchanges between the fish and the frying medium. Of the major isomers of eicosapentaenoic acid formed by thermal action 20:5Δ5c, 8t, 11c, 14t, 17c was < 0.1% of the total 20:5 recovered from the used canola oil. BV

Sardines

555

Colmenero (FJ), Cavestany (M) and Carballo (J). **Effects of levels of fat surimi from sardine (*Sardina pilchardus*) and heat processing on thermal gelation of meat batters.** *Journal of the Science of Food and Agriculture* 62(3); 1993; 267-272

The object of the study was to analyse the rheological behaviour occurring during heat-induced gelation (measured by thermal scanning rigidity monitor) of meat batters containing various proportions of fat (48, 106, 147 and 208 g kg^{-1}) and sardine surimi (0, 100, 200 and 300 g kg^{-1} fish protein added with respect to total protein present) and subjected to different heat treatments (A, heating from 14 to 76°C at a rate of 1°C min^{-1}; B, gradual temperature increase at a rate of 1°C min^{-1} up to 40°C, maintenance at this temp. for 30 min, then heating from 40 to 76°C at 1°C min^{-1}; C, samples kept at 4°C for 20 h and then heated in the same way as process A). The results indicate that differences in levels of fat content significantly affect the gelation patterns of pork batters, gels being stiffer the higher the fat content and the lower the water content. A highly significant correlation ($r = 0.78$, $P < 0.01$) has been established between fat content and max. values of G, which occur at the final experimental temp. of 76°C. In contrast, in general, neither addition of surimi nor variation in the heat treatment applied has any major effect on the gelation process in the system as formulated. AA

Products

Fish

556

Yankah (VV), Ohshima (T) and Koizumi (C). **Effects of processing and storage on some chemical characteristics and lipid composition of a Ghanian fermented fish product.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 227-235

Momoni - a Ghanaian fermented fish product was analysed for the changes in composition of lipid, free amino acids and organic acids and was evaluated for the effectiveness of the traditional method of processing in preservation of the final product. Japanese jack mackerel (*Trachurus japonicus*) was used to make the product. The moisture content decreased from 751 to 505 gkg^{-1} after fermentation for 3 days. Changes in pH were minimal although a gradual decrease was observed from 6.2 in the raw material to 5.9 after 2 months observed from 6.2 in the raw material to 5.9 after 2 months storage. Volatile basic nitrogen (VBN) increased to 0.8 g kg^{-1} on a salt free dry matter basis after 2 months storage. Diphosphatidylglycerol, free fatty acids and lysophosphatidyl choline increased. This method prevented fish spoilage although oxidation was extensive. GS

557

Embarek (PKB) and Huss (HH). **Heat resistance of *Listeria monocytogenes* in vacuum packaged pasteurized fish fillets.** *International Journal of Food Microbiology* 20(2); 1993; 85-95

This work was carried out to investigate the heat resistance of *Listeria monocytogenes* in sous-vide cooked fish products using a valid model system. A fatty fish (salmon) an a non-fatty fish (cod) were used for the experiments to study the protective effect of fat content in the fish on *L. monocytogenes* during heating. Study indicated that the bacteria were protected against heat destruction 1.5 - 4.4 times better in salmon than in cod, depending on the temp. tested. There was a consistent difference in the heat tolerance of strains 062 and 057 as expressed by their average z-values; 5.65 and 6.4°C, respectively. The fat content in salmon varied between 10.56 and 6.4°C, respectively. The fat content in salmon varied between 10.56 an 17.2% (w/w) (n = 6) and in cod between 0.5 and 0.8% (w/w) (n = 3). SRA

Sausages

558

Joshi (VR) and Rudra Setty (TM). **Effect of different levels of spice mixture and salt on the preparation of semi-dried fish sausages.** *Fishery Technology* 31(1); 1994; 52-57

To standardise a semi-dry sausage, different levels of spice mixture having 0.35% black pepper, 0.40% chilli powder, 0.10% garlic, 0.10% ginger, 0.05% coriander and 1.50% salt were tried to find out a suitable level for the Indian palate and their effects on the fermentation pattern. The levels of spice mixture did not have any significant effect on the rate of fermentation and 2.5% level of spice mixture was preferred. Increased salt level delayed fermentation rate. 3% salt gave good taste. SRA

559

Joshi (VR) and Rudra Setty (TM). **Effect of inoculum levels and sugar concentrations on the preparation of fermented semi-dry fish sausages.** *Fishery Technology* 31(1); 1994; 58-63

Fermented semi-dry fish sausages were prepared with 10^6/g, 10^7/g and 10^8/g levels of lactic acid (L.A.) inoculum and 1.0-5.0% sugar. Higher level of inoculum resulted in faster fermentation. The fermentation time required to attain a pH of 5.1 in the sausage were 10 h, 17 h, and 22 h corresponding to 10^8/g, 10^7/g and 10^6/g rate of inoculum. The different levels of LA inoculum had no effect on sensory quality. Fermentation rate was not affected by sugar levels. The panelists prefered 1% sugar. SRA

PROTEIN FOODS

Infant foods

560

Paul (SC) and Mathur (BN). **Influence of processing on physico-chemical properties of lactose hydrolysed infant formula - a review. Paper I.** *Beverage and Food World* 20(5); 1993; 12-14, 19

The influence of various processing parameters like forewarming, vacuum concn., lactose hydrolysis, homogenization and spray drying on the physico-chemical properties of infant food such as colour, bulk density, wettability, sinkability, dispersability, solubility and on protein qualities are briefly discussed in this review. 52 references. SRA

561

Paul (SC) and Mathur (BN). **Improvement of reconstitution properties of spray dried infant formula.** *Beverage and Food World* 20(3); 1993; 22

An attempt to improve reconstitution properties of spray dried infant formula are briefly discussed. Aspects covered include modification in fat globule coating, fat globule coating in milk proteins, fat globule coating by maltodextrin, modification of carbohydrates. SRA

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

562

Chatonnet (P), Dubourdieu (D), Boidran (J-N) and Lavigne (V). **Synthesis of volatile phenols**

by *Saccharomyces cerevisea* in wines. *Journal of the Science of Food and Agriculture* 62(2); 1993; 191-202

Vinylphenols (4-vinylphenol and 4-vinylguaiacol) are natural constituents of wine and can play a role in wine aroma. However, only white wines contain important quantities of these volatile substances which, beyond a certain concn. (limit threshold = 725 µg $litre^{-1}$ of 4-vinylguaiacol + 4-vinylphenol (1:1)), can be responsible for a depreciating 'phenolic' or 'pharmaceutic' characteristics. *Saccharomyces cerevisiae* possesses a type-(E) enzymic activity, substituted cinnamate carboxy-lyase (SCD), which is capable of transforming, by non-oxidative decarboxylation, the phenolic acids in the must, (E) p-coumaric and (E) ferulic acids, into corresponding vinylphenols. This endocellular activity is constitutive, it is only expressed during alcoholic fermentation and with a variable intensity depending on the yeast strain. Furthermore, the enzyme is rapidly inhibited by catechic tannins, which explains why, in comparison with white wines, red and rose wines contain low levels of vinylphenols despite having more precursors. A yeast strain with a weak SCD activity has been selected and its use in vinification should eliminate the appearance of the phenolic taint in white wines coming from grapes rich in decarboxylable hydroxycinnamic acids. AA

563

Lobinski (R), Szpunar-Lobinska (J), Adams (FC), Teissedre (P-L) and Cabanis (J-C). **Speciation analysis of organolead compounds in wine by capillary gas chromatography/microwave-induced-plasma atomic emission spectrometry.** *Journal of AOAC International* 76(6); 1993; 1262-1267

A method was developed for the speciation analysis of ionic organolead compounds in wine. The analytes were extracted as diethyldithiocarbamate complexes into hexane and propylated with a Grigard reagent. The derivatized extract was analyzed by capillary GC/microwave-induced-plasma atomic emission spectrometry. The method of standard additions was used for calibration to correct for variable recoveries and signal enhancements. Red, rose, and white wines from southern France were analyzed. Trimethyllead was the ubiquitous species. The wines made from grapes grown close to industrial zones showed elevated concn. of ethyllead species. The Concn. of methyllead and ethyllead found in wines were compared with the concn. of organolead found in rain water and plant sap collected in the viticultural regions. The ratio of methyllead to ethyllead in wines greatly exceeded the same ratio found in atmospheric deposits. AA

564

Akasaka (K), Ohrui (H), Meguro (H), Suzuki (T) and Miwa (H). **Fluorometric determination of total and bound sulphite in wine by N-(9-acridinyl)maleimide.** *Journal of AOAC International* 76(6); 1993; 1385-1388

N-(9-Acridinyl)maleimide (NAM) reacts with sulphite in wine and gives strong fluorescent derivatives that lead to highly sensitive fluorometry of both total and bound sulphite in wine. Values of free and bound sulphite in wine determined by the NAM method and the modified Rankine method agreed. Sulphite was determined in < 200 µL wine within 2 h. AA

565

Cardwell (TJ), Cattrall (RW), Chen (GN), Scollary (GR) and Hamilton (IC). **Determination of sulphur dioxide in wines and beverages by flow injection analysis with reductive amperometric detection and electrolytic cleanup.** *Journal of AOAC International* 76(6); 1993; 1389

A new flow injection method is described for the detn. of SO_2 in red and white wines and other beverages. A dual-electrode electrochemical detector eliminates interferences by reduction at an upstream coulometric electrode before reductive detection of SO_2 at the amperometric electrode. The data for free and total SO_2 in wines and other beverages agree well with those obtained by the standard aspiration oxidation method. AA

Non-alcoholic beverages

Fruit juices

Grape juices

566

Bayindirli (L). **Density and viscosity of grape juice as a function of concentration and temperature.** *Journal of Food Processing Preservation* 17(2); 1993; 147-151

The purpose of this work was to derive multiparameter models for predicting density and viscosity of grape juice as a function of concn. and temp. The experimental data of density and viscosity of grape juice at different concn. and temp. were utilized to derive the multiparameter models. The derived models satisfactorily represented the variation of density and viscosity of grape juice in the concn. and temp. ranges 19-35°Brix, 20-80°C, respectively. AA

Kinnow mandarin juices

567

Khurdiya (DS). **Production of bitterless Kinnow mandarin juice.** *Science and Culture* 59(7/10); 1993; 65-66

Kinnow mandarin juice extracted by (i) hand reaming, (ii) hydraulic pressing and (iii) screw-type juice extractors were compared for quality, particularly bitterness. The hand reamed juice scored highest for colour (8.17) and flavour (7.66). Juice extracted by hydraulic pressing remained unchanged even after heat processing and obtained highest overall quality scores but only next to the fresh hand reamed juice. The juice extracted by (i) and (iii) were unaceptable because of bitterness developed during heat processing. GS

Soft drink

568

Pagote (CN) and Balachandran (R). **Directly acidified milk-based soft drink.** *Beverage and Food World* 20(5); 1993; 18-19

This article briefly describes a process for the production of sterilized directly acidified milk based soft drink. Aspects covered include formulation method of manufacture (standardization, mixing the ingredients, cooling and acidification of mix, pre-heating and homogenization, addition of colour and flavour, packaging and sterilization, cooling), composition, shelf-life, cost of production, consumer acceptability, product attributes, and techno-economic feasibility. SRA

Tea

569

Kalita (JN) and Mahanta (PK). **Analysis of mineral composition of some Assam and Darjeeling black tea.** *Journal of the Science of Food and Agriculture* 62(2); 1993; 105-109

Minerals like K (40-46 mg), Mg (2.7 - 3.0 mg), Ca (0.48 - 0.66 mg) and traces of Mn (0.28 - 0.40 mg), Fe (0.16 - 0.20 mg), P (29 - 41 μg) and Cu (12 - 22 μg) were found in a cup of black tea brew analysed. Black teas manufactured from pruned section and fine portion showed higher mineral content than tea manufactured from unpruned sections and coarse grade teas of Darjeeling. Assam CTC tea was found to be richer in mineral content compared to Darjeeling orthodox tea. BV

FATS AND OILS

570

Ghosh (S), Bhattacharyya (DK) and Basu (S). **Enzymatic synthesis of polyol esters of fatty acids and their surface active properties.** *Journal of the Oil Technologists Association of India* 25(4); 1993; 79-81

Non-ionic surface active molecules like lauric, myristic and oleic acid esters of polyethylene glycol of varying mol. wt. can be readily synthesised in a very high yield by enzymatic esterification process using *Mucor miehei* lipase as catalyst. The saturated fatty acid esters were much better surface active molecules than the corresponding oleic acid esters. An inverse relation exists between the chain length of saturated acid and the corresponding mol. wt. of polyethylene glycol. AA

571

Sen (S) and Sen (DP). **Oxidised fatty acid content of heat damaged frying oils and Indian deep fat fried products.** *Journal of the Oil Technologists Association of India* 25(4); 1993; 89-91

Ten samples of heat damaged oils used for deep fat frying in commercial eating houses had oxidised fatty acid content ranging from 0.4 to 2.8%, 8 having more than 1%. Total lipid extracted from 3 popular deep fat fried market products of Indian taste, viz., nimki, potato chips and puree had oxidised fatty acid contents ranging from 1.1 to 3.6% by wt. of total lipid or 0.5 to 1.0% by wt. of the product. AA

572

Churi (RY) and Subrahmanyam (VVR). **Properties of sulfurized and co-sulfurized products from olefinic substrates.** *Journal of the Oil Technologists Association of India* 25(4); 1993; 97-99

Neem oil (*A. indica*), karanja oil (*P. pinnata*), alpha olefin and its blends with karanja oil, karanja oil mono- and dihydric esters were sulfurized. 180 g of substrate was heated upto 160°C in 500 ml beaker for 20 min with constant stirring. 20g of sulphur powder was added gradually, the temp. raised to 180°C and maintained for 1 h. The contents were cooled to 140°C. Compressed air was blown through the mass taken on a 3 neck flask for 1 h at 140°C. The products were analysed for sulphur content, copper strip corrosion test, AV, IV, refractive index, pour point and viscosities at 40°C and 100°C. Degummed neem oil gave a product similar to that of karanja oil. Viscosities of sulphurized neem oil at 40 and 100°C were lower than those of karanja oil but both of them had identical viscosity index. Neem oil gave a product having low viscosity and higher pour point than that from karanja oil. The alpha olefin having much lower viscosity, 1.2 cst at 100°C and higher iodine value (117.6) than the triglyceride oils, gave a sulphurized product with very low pour point (-15°C) and low viscosity (6.2 and 2.2 cst at 40 and 100°C). The product obtained was more corrosive to copper than those from triglyceride oils. The sulphurized products from methyl esters and ethylene glycol esters of karanja oil had viscosities of 16.2 and 137.4 cst at 40°C as compared to 2010 cst for sulfurized karanja oil. A blend of sulfurized karanja oil and sulfurized alpha olefin had a viscosity of 19.0 cst at 100°C. The co-sulfurized product of 1:1 blend of karanja oil and alpha olefin had a viscosity of 11.9 cst at that temp. GS

573

Tyagi (VK) and Pramod Kumar. **Formation of polymeric fractions in frying fats.** *Journal of the Oil Technologists Association of India* 26(1); 1994; 13-16

Polymeric fractions formed in deep-fat frying of potato chips using refined, bleached and deodorised (RBD) soybean oil without and with antioxidants (BHA/TBHQ) and vanaspati by urea fractionation were quantitatively determined. The frying experiments were conducted for 70 h at 170, 180 and 190°C. The % of non-urea-adduct forming esters indicative of polymeric fractions were found to have their highest values ranging from 20-30% at the aforesaid frying temp. in case of soybean oil whereas these values corresponded to 14-18% with vanaspati. The role of antioxidants, however, proved to be insignificant in reducing the extent of polymerisation of frying media at frying temp. AA

574

Hafizoglu (H) and Reunanen (M). **Studies on the components of *Laurus nobilis* from Turkey with special reference to Laural berry fat.** *FAT Science Technology* 95(8); 1993; 304-308

The composition of laurel berry fat produced in Turkey was studied by GC and MS. Of the 20 fatty acids occurring in acidic fraction lauric acid (54.2%), oleic acid (15.1%) and linoleic acid (17.2%) were found to be dominating constituents. Some minor components identified in the unsaponifiable fraction, i.e. undecanone, α-terpineol, terpinyl acetate, β-elemene, and β-sitosterol, have not previously been reported in laurel berry fat. AA

575

Graille (J). **Food and oleochemical uses of the lauric complex.** *Oleagineux* 48(12); 1993; 515-525

Aspects covered are food uses of lauric oils (margarines, shortenings, different uses) and non-food uses. BV

576

Maskan (M), Oner (MD) and Kaya (A). **Storage stability and accelerated shelf-life testing of margarine samples.** *Journal of Food Quality* 16(3); 1993; 175-186

Oils

577

Yoshida (H). **Influence of fatty acids of different unsaturation in the oxidation of purified vegetable oils during microwave irradiation.** *Journal of the Science of Food and Agriculture* 62(1); 1993; 41-47

Purified vegetable oils (PVO) (soybean, safflower and rapeseed) containing stearic, oleic, linoleic or linolenic acid at different levels (0.5 - 10.0 kg^{-1}) were exposed to microwave irradiation for several periods of time. The extent of effect depended on the degree of unsaturation of added fatty acids and/or PVO. During microwave treatment the oxidative rate of PVO was rapid in the presence of the unsaturated fatty acids, but comparatively lower for the corresponding saturated fatty acid or hydrocarbon. The oxidative state of the oils was lower in the rapeseed oil than in the soybean oil or safflower oil. BV

578

Strocchi (A) and Marascio (G). **Structural modifications of 4,4'-dimethyl sterols during the hydrogenation of edible vegetable oils.** *FAT Science Technology* 95(8); 1993; 293-299

The structural changes induced by the hydrogenation of dietary vegetable oils affect not only fatty acids but sterolic components too, especially C-24-methylene and C-24-ethylidene sterols. The main alterations found in the triterpene alcohols involve 24-methylene-cycloartenol and, to a lesser extent, cycloartenol. Of the 3 potential hydrogenation-induced reactions to affect these compounds, i.e., hydrogenation of the soluble ethylene bonds, the opening of the cyclopropane ring and the isomerization of the double bonds in the side chian, the later is predominant. Cyclobranol and cyclosadol from 24 methylene cycloartanol and 9β,19-cyto-5α-lanost-25-en-3β-ol from cycloartenol account for most of the structural isomers formed. AA

579

Buchold (VH). **The enzyme-catalyzed degumming process of vegetable oils.** *FAT Science Technology* 95(8); 1993; 300-304 (De)

The new degumming process EnzyMax is the first to use a natural enzyme as a biocatalyst for phosphatide removal from vegetable oils. The enzyme Phospholipase A2 splits off the fatty acid linked in the sn-2 position of the phospholipid molecule thus imparting oil-insolubility to the remaining 1-acyl-lysophospholipid and making it amenable to separation. The EnzyMax degumming process can be used on all kinds of oil seed and varying oil qualities with consistently good performance. Even the addition of small enzyme amounts of abt. 700 lecitase units per kg of oil reduces the residual phosphorus concn. to below 10 p.p.m. As a result, chemical refining can be replaced by physical refining thus eliminating the need for neutralization, soapstock splitting and waste water treatment. AA

580

Mishra (VK), Temelli (F) and Ooraikul (B). **Extraction and purification of ω-3 fatty acids with an emphasis on supercritical fluid extraction - a review.** *Food Research International* 26(3); 1993; 217-226

The chemistry, sources of ω-3 fatty acids (fish oil, seed oils, algal lipids) and processing methods for extraction (fish oil, algal lipids) and purification; recent advances in supercritical fluid extraction and chromatography with their advantage; and potential health benefits of ω-3 fatty acids are reviewed. 62 references. GS

581

Court (WA), Hendel (JG) and Poes (R). **Determination of the fatty acids and oil content of evening Primrose (*Oenothera biennis* L.).** *Food Research International* 26(3); 1993; 181-186

A rapid method for the analyses of oil content and individual fatty acids of evening primrose is described. Oil was extracted from the seed with a Polytron probe generator using petroleum ether. A portion of the extract was concentrated to determine oil content. Results obtained with a Soxhlet extraction procedure using the same solvent. Saponification of the oil with methanolic sodium hydroxide, methylation with methanolic sulphuric acid, and extraction of the esters with hexane was accomplished in a single reaction vial. Quantitation of the extracted esters was carried out by capillary GC. A number of fatty acids were identified by GC-MS studies of the extracted esters and methyl esters separated by their degree of unsaturation with silver nitrate silicic acid chromatography. Saturated fatty acids from C_{12} to C_{24} were present in the oil with the even numbered acids present in the larger amounts. Eight monounsaturated fatty acids from $C_{14:1}$ to $C_{20:1}$ were identified with $C_{18:1}$ (n-9) as the major constituent of this fraction. Seven polyunsaturated fatty acids were identified with $C_{18:1}$ (n-6) and $C_{18:3}$ (n-6) as the major components. Analysis of seeds from different parts of evening primrose plants showed that differences in γ-linolenic [$C_{18:3}$ (n-6)] acid and oil content exist due to location of the seed pods. AA

Jojoba oils

582

Bhatia (VK), Kaul (S) and Kapoor (VB). **Synthesis of shorter chain alcohol esters of jojoba oil.** *Journal of the Oil Technologists Association of India* 26(1); 1994; 23-25

Jojoba oil, because of its higher stability as compared to other vegetable oils, can be a potential source for formulating lubricating oils. The scope of its applications can be widened if some of its properties can be modified. Results of studies carried out on the alcoholysis of jojoba oil using short chain alcohols to prepare esters with improved pour points are reported. AA

Rapeseed oils

583

Gustafsson (IB), Haglund (A) and Johansson (L). **The taste of dietary fat based on rapeseed oil was superior to that based on sunflower oil when used for frying and baking.** *Journal of the Science of Food and Agriculture* 62(3); 1993; 273-281

Two liquid margarines based on (i) sunflower oil and (ii) rapeseed oil were used for frying and baking. Margarines, pancakes and fresh minced beef were heated to 165, 175 or 185°C in electric frying pans for 3-5 min and sweet white bread and cakes were baked. The fried rapeseed oil margarine (ROM) was judged to be more free from off-flavour and rancidity than the fried sunflower oil margarines (SOM). This difference in off-flavour increased with an increase in temp. The sweet white bread and the caked baked with ROM were preferred to those baked with SOM. Results also indicate ROM to be more resistant to heat than SOM. GS

SPICES AND CONDIMENTS

Condiments

Papads

584

Manan (JK), Kulkarni (SG) and Shukla (IC). **Studies on preparation, packaging and storage of wheat papads.** *Beverage and Food World* 20(3); 1993; 19-21, 22

Wheat papads were prepared from whole wheat grains soaked in sulphited and acidified water for 72 h at 30 plus or minus 5°C with change of water every 24 h. These papads were deep fried at 180°C and were analyzed for sensory qualities. The papads showed white, flufy appearance, crisp texture, melting mouthfeel and good diametric expansion (67.3%). The papads packed in polypropylene bags had a shelf-life of 6 months at room temp. (18.31°C). SRA

Essential oils

585

Deighton (N), Glidewell (SM), Deans (SG) and Goodman (BA). **Identification by EPR spectroscopy of carvacrol and thymol as the major sources of free radicals in the oxidation of plant essential oils.** *Journal of the Science of Food and Agriculture* 63(2); 1993; 221-225

The production of the free radical species on oxidation of the volatile fraction of several medicinal plants were investigated by electron paramagnetic resonance (EPR) spectroscopy. Essential oils (EO) from organo, summer savoury and thyme produced EPR spectra. Free radicals formed in the EO supplement α-tocopherol in the control of lipid peroxidation in plant membranes. GS

Spices

586

Rawle (UP), Israni (RK), Saxena (VB) and Adinarayanaiah (CL). **Identitication of common moulds from spices in Nagpur market.** *Beverage and Food World* 20(5); 1993; 20, 23

140 samples of different types of spices (black pepper, turmeric, chillies, coriander, cumin, betelnut, fennel, ginger) collected from Nagpur were analyzed for mould content. The highest mould content of 4.2 x 10^3 was observed in chillies. Predominant species observed was *Aspergillus* spp. except in cumin. *Rhizopus* spp., *Alternaria* spp., *Helminthosporium* spp., *Pencillium* spp., *Mortirella* spp., *Neurospora* spp. were the other moulds identified. SRA

587

Hosokawa Micron. **Turning up the heat.** *Food Manufacture* 68(8); 1993; 15

New production scale unit for the sterilising of spices and herbs using saturated steam as a sterilising medium has been developed by Hosokawa Micron Europe. The usual problem of non-required continuation of high temp. exposure has successfully been solved by applying full vacuum immediately after the sterilising stage in the same vessel. Fast evaporation using the high energy content of wet product, dries and cools down the batch to acceptable level in very short time frame. This way the loss of valuable oils is minimised. SRA

SENSORY EVALUATION

588

Hodgson (AS) and Bruhn (CM). **Consumer attitudes toward the use of geographical product descriptors as a marketing technique for locally grown or manufactured foods.** *Journal of Food Quality* 16(3); 1993; 163-174

Consumer attitudes towards products descriptors for kona coffee, kona coffee blend, Hawaii coffee and Island fresh were collected from 5 focus groups in 4 countries of Hawaii. Kona coffee was identified as appropriate descriptor for 100% kona coffee; Kona coffee blend for at least 50% kona coffee; Hawaii coffee for coffee grown in Hawaii and Island fresh for traditional, perishable foods grown, harvested and/or slaughtered on the island except milk, dairy products and roasted coffee beans. Results also indicated that the findings were representative of Hawaii residents; that Hawaii consumers were consistent with the rest of the nation and Food and Drug Administration in their truthful labeling. SRA

589

Jaime (I), Mela (DJ) and Bratchell (N). **A study of texture-flavour interactions using free-choice profiling.** *Journal of Sensory Studies* 8(3); 1993; 177-188

Interactions betweem perceptions of texture and volatile flavours were assessed by free-choice profiling using gelation desserts as a model product. Gels were prepared with all combinations of 2 levels of gelation, and 2 concn. of 2 different flavours. A trained sensory panel profiled each sample for aroma, flavor, and oral and manual texture. Generalized Procrustes Analysis was carried out separately for each sesory modality. The results indicate that while gelatin concn. and flavour type both modified perception of flavour, flavour concn. did not. Gelation content influenced instrumental, oral, and manual evaluations of texture; however, the type and level of flavouring had little influence on oral perception of texture. AA

590

Vickers (ZM), Christensen (CM), Fahrenholtz (SK) and Gengler (IM). **Effect of questionnaire design and the number of samples tasted on hedonic ratings.** *Journal of Sensory Studies* 8(3); 1993; 189-200

A total of 450 consumers participated in a test to determine whether questionnaire length, presence of key diagnostic questions or serving position affected their hedonic discrimination among yellow cakes. Consumers evaluated 4 yellow cakes representing a 2 x 2 factorial design of testure and flavour flaws. They used one of the following 6 questionnaires: only a 9-point hedonic scale, a 9-point hedonic scale with open end questions, and 4 others comprising a 2 x 2 factorial design with two levels of questionnaire length and two levels of questionnaire completeness. Neither the presence of key attribute questions not the length of the questionnaire affected the value or the sensitivity of the judges' overall liking scores. Samples tasted first received higher hedonic scores than those same samples tasted second through fifth. Judges could discriminate among the samples on the basis of overall liking best when samples were tasted fourth or fifth. AA

591

Cliff (M) and Heymann (H). **Time-intensity evaluation of oral burn.** *Journal of Sensory Studies* 8(3); 1993; 201-211

Temporal oral burn profiles for cinnamaldehyde, piperine and capsaicin were quantified using time-intensity (TI) parameters. Despite large judge-to-judge variation. TI profiles for eaters and noneaters of chile peppers differed significantly. Eaters had lower max. intensities, shorter total times, and slower max. rates of onset and decay. Judges with substantial desensitization also had shorter time-to-max. intensitites. Desensitized judges not only scored the burn of capsaicin as less intense, but also the burn of cinnamaldehyde and piperine: The burn of cinnamaldehyde sol. increased and decayed quickly; whereas, burns due to piperine and capsaicin increased and decayed slowly. Capsaicin compared to cinnamaldehyde, had time-to-max, plateau time, and total time that were 1.5, 2.0 an 3.0 fold larger; whereas, the max. rates of onset and decay were 0.7 and 0.2 fold smaller, respectively. Temporal differences are believed to reflect differences in neural pathways for the irritant species. AA

592

Irwin (RJ), Stillman (JA), Hautus (MJ) and Huddleston (LM). **The measurement of taste discrimination with the same different tast. A detection-theory analysis.** *Journal of Sensory Studies* 8(3); 1993; 229-239

The biasis to which the same-different task is prone can be accoutned for by having subjects rate their confidence that two stimuli are the same or different. The rating method of detection theory was therefore used to study the discriminability of two concn. of a fruit drink. A model in which the decision variable was the difference in sensory strength of the two samples provided a satisfactory fit to the Receiver Operating Characteristics of 4 of the 5 subjects. The bias-free index of discriminability, d', was estimated for each subject. A combined operating characteristic, derived from jackknifing the data of the individual subjects, revealed an asymmetry characteristic of the differencing model. The results suggests that the same-different tast, which is readily understood by subjects, can provide an unbiased measure of the discriminability of foods or beverages. AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

593

Borah (BK). **Efficacy of some insecticides alone and in combination with mechanical**

measure against plassey borer, Chilo tumidicostalis Hmpsn. *Indian Sugar* 43(12): 1994; 931-933

Field experiments were conducted in 1990-91 and 1991-92 to assess efficacy of insecticides with or without agronomic manipulations against plassey borer in Chilo tumidicostalis Hmpsn. Phosphamidon 0.05, monocrotophos 0.04, endosulfan 0.06 and fenitrothion 0.08% were sprayed with or without removal of affected shoots in July and September before spraying. The incidence and intensity were significantly lower in plots treated with phosphamidon in combination with rogueing as compared to other treatments. Highest productivity of sugarcane, 61.2 and 59.4% t/ha was registered with phosphamidon 0.05% and rogueing of affected shoots in July and September wheras untreated check yielded 47.2 and 44.4 t/ha in the 2 yr respectively. AA

594

Patra (SK) and Deb Roy (S). **Testing and quality control of pesticides residue in food and vegetables.** *Indian Food Packer* 47(6): 1993; 16

Testing procedure for pesticide residue in food and vegetables and the parameters used for analysis of different isomers of hexachloro cyclohexane, malathion and DDT are outlined. GS

Pesticides

595

Dittus (KL) and Hillers (VN). **Consumer trust and behaviour related to pesticides.** *Food Technology* 47(7): 1993; 87-89

Deals with the study conducted to determine consumers' level of trust regarding the safety of pesticides and to characterize the pesticide concerns and attitudes of consumer's with high- and low-trust levels. CSA

596

Winter (CK). **Pesticide residues and the Delaney clause.** *Food Technology* 47(7): 1993; 81-86

This article reviews the history of the 'Delaney Paradox' controversy, discusses the potential impacts of the ruling upon pesticide use, examines the potential health significance of the ruling with respect to pesticide residues, and considers some of the issues surrounding efforts to minimize the effect of the court's ruling. 11 references. CSA

BIOCHEMISTRY AND NUTRITION

597

Sen (S), Banerjee (R), Mukherjee (KL) and Sen (DP). **Oxidised cholesterol content of a few foods.** *Journal of the Oil Technologists Association of India* 26(1): 1994; 17-21

Ghee (in sealed or loose containers), heat damaged ghee, puree fried in ghee, hen's egg, hard boiled hen's egg, pan-fried hen's egg (omelette) and spray-dried egg powder were found to contain oxidized cholesterol compounds, viz., 7α-hydroxycholesterol, 7β-hydroxycholesterol, 25-hydroxycholesterol, 7-ketocholesterol, cholesta-3,5-dien-7-one and one, unidentified. AA

598

Roberfroid (M). **Dietary fiber, inulin, and oligofructose: A review comparing their physiological effects.** *CRC Critical Reviews in Food Science and Nutrition* 33(2): 1993; 103-148

262 references. SRA

599

Nakai (S) and Li-Chan (E). **Recent advances in structure and function of food proteins: QSAR approach.** *CRC Critical Reviews in Food Science and Nutrition* 33(6): 1993; 477-499

Review. 113 references. BV

600

Al-Hasani (SM), Hlavac (J) and Carpenter (MW **Rapid determination of cholesterol in single and multicomponent prepared foods.** *Journal of AOAC International* 76(4): 1993 902-906

A rapid method has been developed for cholesterol detn. in single and multicomponent foods. The method involves alcoholic KOH saponification of the samples, extraction of the nonsaponifiable fraction with hexane, and injection of concentrated extract into the GC without derivatizations. It has been applied to a wide variety of frozen and refrigerated foods. More than 300 samples were analyzed with a coeff. of variation (CV) ranging from 0.5 to 8.6%. The av. recoveries of cholesterol from spiked oil and tomato vegetable soup samples were 100 plus or minus 1.5% and 99.7 plus or minus 1.6% and the cvs were 1.5 and 1.6%, respectively. This method reduces labour by > 70%, eliminates dangerous chemicals, and minimizes solvent use, compared to the AOAC method and other methods cited in the manuscript. The method was used successfully on a wide var. of multicomponent foods. This method is recommended for collaborative study under the AOAC guidelines for method approval. AA

601

Chase (GW), Landen (WOJr), Soliman (A-GM) and Eitenmiller (RR). **Method modification for liquid chromatographic determination of thiamine, riboflavin and pyridoxine in medical foods.** *Journal of AOAC International* 76(6); 1993; 1276-1280

A reversed-phase ion pair liquid chromatographic method developed for the simultaneous detn. of thiamine (B_1), riboflavin (B_2) and pyridoxine (B_6) in perchloric acid extracts of infant formulas was modified to include medical foods. UV detection of B_1 and B_2 was replaced in improved sensitivity and specificity. B_1 was detected by fluorescence after conversion to thiochrome by a potassium reaction with sodium hydroxide and potassium ferricyanide. The method uses a mobile phase of water, acetonitrile, hexanesulfonic acid, sodium salt, ammonium hydroxide, and phosphoric acid adjusted to pH 3.6. The column is a 300 x 3.9 mm Nova Pak C_{18}. Limits of detection were 0.05 μg/mL for B_1 and B_2 and 0.01 μg/mL for B_6 by fluorescence detection. The system reproducibility was evaluated by completing 10 reptitive detn. on a medical food that gave a coeff. of variation of 5.9, 6.0 and 10.7% for B_1, B_2 and B_6, respectively. Mean recoveries (n = 10) were 111, 96.3 and 113% for B_1, B_2 and B_6 respectively. The results compared favourable with those by AOAC Official Methods 942.23, 940.33 and 961.51 for B_1, B_2 and B_6 respectively. AA

TOXICOLOGY

602

Appaiah (KM), Sreenivasa (MA) and Nagaraja (KV). **A quick test for the detection of ethylene dibromide residues in food grains.** *Indian Food Packer* 48(1); 1994; 63-66

EDB residues in wheat samples were extracted with diethyl ether and the solvent was evaporated to dryness. The residue was redissolved in ethyl alcohol. The organic bromide was converted to inorganic bromide by treatment with dilute acetic acid (1:10) and Zn dust and the inorganic bromide liberated by treatment with dilute acetic acid and lead dioxide. The liberated bromine turns fluorescein impregnated filter paper from yellow to pink. AA

603

Park (DL). **Controlling aflatoxin in food and feed.** *Food Technology* 47(10); 1993; 92-96

The management plan discussed in this article will address the establishment of limits and regulations that are legally enforced, monitoring programs for commodities (i.e. cottonseed, susceptible to aflatoxin contamination) and decontamination procedures designed to remove or inactivate the toxicant in feed or food. CSA

FOOD LAWS AND REGULATIONS

Nil

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GENERAL

604

Garg (N), Tandon (DK) and Kalra (SK). **Utilization of fruit industry waste.** *Beverage and Food World* 21(1); 1994; 16-20, 24

This article covers the utilizable and potentially utilizable waste originating from major fruit (apple, citrus, grape, mango, pineapple) processing industries and their possible/probable utilization. 81 references. SRA

FOOD PROCESSING

605

Srivastav (PP), Das (H) and Prasad (S). **Effect of roasting process variables on hardness of Bengalgram, maize and soybean.** *Journal of Food Science and Technology (India)* 31(1); 1994; 62-65

Bengalgram, maize and soybean grains were roasted at 12 plus or minus 0.5% initial moisture content and 1:4 grain-to-sand ratio at 180, 215 and 250°C sand temp. for 1.5, 2.0 and 2.5 min roasting time, to study the effect on hardness after roasting. Sand temp. was observed to be significant in all the cases. In general, the hardness decreased with roasting time. The optimum conditions for roasting were obtained by the canonical analysis of response surface methodology. AA

FOOD PACKAGING

606

Mahadeviah (M), Gowramma (RV), Naresh (R) and Mahendra Pandian (S). **Influence of some edible corrosion inhibitors to inhibit corrosion in food cans.** *Indian Food Packer* 48(2); 1994; 11-23

Various components of cabbage were separated and their influence on the inhibition of corrosion in tinplate containers by some corrosive fruit and vegetable products studied. Cabbage pulp and fibre were found to give complete protection to cans packed with the highly corrosive vegetable, ivy gourd. Inhibition effect of cabbage powder on tin corrosion by banana puree, pineapple juice, mango juice etc. and efficiency of a few phospholipids in inhibiting corrosion using several corrosive products were studied. These compounds showed beneficial effect in reducing corrosion to varying degree and could be adopted in the canning industry. AA

607

Doblas (J), Voldrich (M), Pudil (F) and Curda (D). **The thermostability of paperboard food packing.** *Die Nahrung* 37(2); 1993; 115-118

Three different methods of isolation of volatiles released by heating of the paperboard were compared. The volatiles produced by 30-60 min of heating at 150°C were isolated by: (1) extraction with dimethyl ether (2) distillation with trapping in cooled diethyl ether and (3) adsorption on TENAX GC. The isolated volatiles were analyzed by GC coupled with the MS detection. The TENAX adsorption seems to give the best results, better than the other methods, by use of which not only volatiles were isolated and some part of volatiles was lost also by subsequent reactions of those. AA

FOOD ENGINEERING AND EQUIPMENT

608

Bassal (A), Vasseur (J) and Loncin (M). **Sorption isotherms of food materials above 100°C.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 505-511

Desorption isotherms and isobars are presented for microcrystalline cellulose (MCC), potato starch, cake dough and lactose measured at temp. between 100 and 140°C using a manometric and dynamic sorption method. From 9 mathematical models which have been transformed to take into account the effect of temp. and pressure, Oswin's modified model seems to be the best to fit the experimental data. Isosteric heat was calculated in this field of temp., for MCC, potato starch, and cake doughs using the Clausius-Clapeyron equation. The effect of temp. on isosteric heat is negligible compared to that of moisture content. AA

609

Gonzalez Mendez (NF), Djelveh (G) and Gros (JB). **Performance of scraped surface heat exchangers in foaming food processes.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 538-543

The foaming process was studied in scraped surface heat exchangers (SSHE) under steady-state flow conditions. A model food was used; to ensure foaming, it was subjected to several experiments in batches using a stirred tank. These showed that temp. up to 50°C improved foaming capacity. Stability of the product was improved when temp. reached the temp. of protein coagulation. Concn. of starch up to 3 g/100 g increased apparent viscosity and improved stability of the product. In SSHEs foaming yield was similar to that obtained in a stirred tank. Foaming capacity depended on gas flow rate; rotation speed improved foaming capacity up to 1150 r.p.m. The advantage of SSHE over other rotor-stator mixers is the possibility of controlling the protein denaturing, and the stabilization and pasteurization of the product. AA

610

Hozova (B) and Takacsova (M). **The influence of combined storage procedures of foods on B vitamins content demonstrated at the example of heat sterilization and irradiation.** *Die Nahrung* 37(4); 1993; 345-351

Presents a literary survey of accessible information on the applications of binary and trinary combinations of preservation methods (thermosterilization and irradiation with other preservation methods) and on their influence on B vitamin groups (thiamine, riboflavin, vitamin B_6 and folacin) in comparison with traditionally used thermosterilization. The advantages of the combined techniques of preservation as a real possibility to replace the traditional preservation techniques by non-traditional and less destructive processes is also reported. BV

611

Jain (SK), Jain (RK) and Bera (MB). **Qualitative and quantitative analysis of dust pollution in dhal mill.** *Journal of Food Science and Technology (India)* 31(1); 1994; 55-57

In-plant air samples of *dhal* mills were analysed for their quantity, chemical makeup, paticle size and fungal profile. The av. concn. of suspended and settleable dust was 0.057 g/m^3 and 0.065 kg/m^2/day. The av. particle size of the suspended dust was found to be 3.2 μ, while the major portion of the dust was chemically organic in nature. *Aspergillus* and *Penicillium* species were found to be associated with the *dhal* dust. In-plant air samples of all the *dhal* mills were found to be severely polluted. Several pollution control measures are suggested. AA

Equipments

612

Anon. **A method for the assessment of in-line steam sterilizability of food processing equipment.** *Trends in Food Science and Technology* 4(3); 1993; 80-82

The procedures to test the in-line steam sterilizability of equipment recommended by the Test Methods subgroups of the European Hygienic Equipment Design Group are summarized. BV

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

613

Yen (G-C) and Tsai (LC). **Antimutagenicity of a partially fractionated Maillard reaction product.** *Food Chemistry* 47(1); 1993; 11-15

Maillard reaction product prepared by refluxing glucose (0.5 M) and tryptophan (0.5 M) at pH 11.0 and 100°C for 10 h was further fractionated into different mol. wt. (MW) below 1000, 1000-5000, 5000-10000, 10000-30000, 30000-50000 and above 50000 by membrane filters. The trends of browning, reducing power, antioxidative activity and antimutagenicity of each glucose-tryptophan (GT) fraction were of MW above 5000 > unfractionated > MW below 1000. The antimutagenicity of each GT fraction exhibited a suitable correlation with these characteristics. The reducing power and antioxidative activity of each GT fraction played an important role in antimutagenicity. An inhibitory mechanism of GT was due to a desmutagenic effect but not a bio-antimutagenic effect. SD

614

Gorbachev (MYu), Gren (AI), Manzhos (AV) and Lobasyuk (BA). **Dependence of biological response on the geometric and electronic characteristics of phenol derivatives with smoke flavour.** *Die Nahrung* 37(2); 1993; 161-169

On the base of the data of conformational analysis and quantum-chemical calculation (method CNDO/2) of the series of phenol derivatives with smoke flavour it was shown that the structural fragment responsible for the odorant activity consists of the oxygen atom and 2 hydrogen atoms. The atomic orbitals of these atoms are constituting the highest occupied mol. orbid (HOMO) with the high values of the orbital coeff. of their 2pπ- and 1s-orbitals. The distance between the hydrogen atoms is 1.7 - 2.5 A, while the average distance (L) from these hydrogen atoms to the oxygen atom is 5.45 plus or minus 0.85 A. The dependence between the value of psychological response for the presence of the studied compounds within the gaseous phase and the value L was found. AA

615

Stauffer (CE). **Trypsin inhibitor measurement: Effect of order of reagent addition.** *Cereal Chemistry* 70(1); 1993; 111-112

Chemistry(Analytical)

616

Grosch (W). **Detection of potent odourants in foods by aroma extract dilution analysis.** *Trends in Food Science and Technology* 4(3); 1993; 68-73

Aroma extraction dilution analysis (AEDA) - a quantitative GC olfactometry procedure that is used to evaluate the activity of odourants; its application to the study of food flavours and off flavours; quantification of odour concn. in foods and calculation of odour active values (OAV) are reviewed. 50 references. GS

617

Hopia (A). **Analysis of high molecular weight autoxidation product using high performance size exclusion chromatography: I. Changes during autoxidation.** *Lebensmittel-Wissenschaft und -Technologie* 26(2); 1993; 563-567

Autoxidation of edible oils was studied by monitoring the levels of high mol. wt. autoxidation products using high performance size exclusion chromatographic analysis. The oils in question were 2 commercially available rapeseed oils, two soybean oils and 2 sunflower oils. Autoxidation of a non-refined sunflower oil with no initial polymeric compounds was also studied. Samples were autoxidized in the dark at 60°C. During the autoxidation an increase was detectable in the level of oxidized triacylglycerol monomeric (PTAG) and dimeric (TGD) compounds. No higher oligomeric compounds were detected in the samples. The content of PTAG compounds started to increase at the begining of autoxidation. After 4 days autoxidation, the content of TGD compounds had also increased in each of the samples. After 13 days autoxidation, the content of PTAGs was 39-167 g/kg and that of TGD compounds 5-28 g/kg. The PTAG and TGD contents of the oils depended on the autoxidation level rather than on the type of oil studied. The highest PTAG and TGD contents were detected in the samples with the highest peroxide values. AA

618

Hopia (A). **Analysis of high molecular weight autoxidation products using high performance size exclusion chromatography: II. Changes during**

processing. *Lebensmittel-Wissenschaft und -Technologie* 26(6); 1993; 568-571

High performance size exclusion chromatography (HPSEC) was used for analysing the quality of vegetable oils during the industrial refining process. The main interest focused on the contents of high mol. wt. autoxidation product: oxidized triacylglycerols (PTAG) and triacylglycerol dimeric compounds (TGD). The diacylglycerol and free fatty acid contents of the oils were also monitored. Three vegetable oils (sunflower oil, soybean oil and low euric acid rapeseed oil) were used as test materials. In crude oils, the content of PTAG compounds ranged from 5.3 to 9.0 g/kg of oil and that of diacylglycerols from 6.1 to 12.5 g/kg, indicating the different autoxidative and hydrolytic qualities of the raw materials. No dimeric or higher oligomeric TAG compounds were detected in crude oils. The major change during the refining process detected by HPSEC analyses was the increase in TGD content after bleaching and deodorization. In refined oils, the TGD content ranged from 1.2 g/kg for rapeseed oil to 2.3 g/kg for sunflower oil. A slight decrease in PTAG content after bleaching was detected in each of the samples. The content of PTAG compounds in refined oils was comparable to that in crude oils. The decrease in free fatty acid content after neutralization was clear but there was no change in the diacylglycerol content during the processing. HPSEC analysis is a suitable method for monitoring the level of high mol. wt. autoxidation products during the processing of edible oils and for analysing the autoxidative quality of oils after industrial refining. AA

619

Prieta (J), Moreno (MA), Bayo (J), Diaz (S), Suarez (G), Dominguez (L), Canela (R), Sanchis (V). **Determination of patulin by reversed-phase high-performance liquid chromatography with extraction of diphasic dialysis.** *Analyst (London)* 118(2); 1993; 171-173

A simple and economical method is reported for the detn. of patulin in apple juice. The sample is extracted with ethyl acetate in a diphasic dialysis system and the extract is cleaned up by elution from a Sep-Pak cartridge. Patulin is detected and determined by RP-HPLC using a Novopak C_{18} column and an ultraviolet detector. The lower detection limit is 1 $\mu g l^{-1}$ and recovery is 85% at the 20 $\mu g l^{-1}$ level. BV

FOOD MICROBIOLOGY AND HYGIENE

620

De Ruiter (GA), Notemans (SHW) and Rombouts (FM). **New methods in food mycology.** *Trends in Food Science and Technology* 4(4); 1993; 91-97

Reviews the current state of knowledge on the development and applicability of immunoassays for the detection of moulds in foods. The different types of immunoassays, rapidity, accuracy and sensitivity of the immunoassays in detecting moulds in heat treated or filtered food products are highlighted. GS

621

Sangsuk (O). **Immunosensors for food safety.** *Trends in Food Science and Technology* 4(4); 1993; 98-103

Reviews the affinity-based detection methods to identify food contaminants and microbial pathogens types of transducers adapted such as electrochemical, optical and piezoelectric transducers; immunoassay configurations; electrochemical interactions between antibodies and antigens; and prospects and application of immonosensors in food analysis and safety. 19 references. GS

Fermented foods

622

Bonestroo (MH), Kusters (BJM), de Wit (JC) and Rombouts (FM). **The fate of spoilage and pathogenic bacteria in fermented sauce-based salads.** *Food Microbiology* 10(2); 1993; 101-111

To investigate the possible growth and persistence of spoilers and pathogens, salads were inoculated with *Klebsiella pneumoniae*, *Bacillus cereus*, *Listeria monocytogenes* and *Staphylococcus aureus* and fermented with lactic acid bacteria. A rapid decrease of pH, in addition to a low final pH (< 4.2) were necessary to inhibit the growth and survival of *Kl. pneumoniae*. Growth or survival of *B. cereus* in cabbage-ham salads inoculated with *Staph. aureus* (420 cfu g^{-1}) and fermented at 45°C with *Lactobacillus* spp., *Staph. aureus* increased 5 to 6 generations. Less growth occured in salads composed of ingredients with lower buffering capacities. Cabbage salads inoculated with *L. monocytogenes* and fermented with different strains of *Lactobacillus* spp., 2 to 3 generations of growth occured during fermentation followed by rapid decline to undetectable levels. SRA

Microorganisms

623

Notermans (S), in't Veld (P), Wijtzes (T) and Mead (GC). **A user's guide to microbial challenge testing for ensuring the safety and stability of food products.** *Food Microbiology* 10(2); 1993; 145-157

This article describes the theoretical aspects of microbiological challenge testing (MCT): identification of hazardous microorganisms (microbiological status of raw materials and end product, handling of the product following distribution, identification of risks of food-poisoning and product spoilage, properties of relevant microorganisms, growth potential of microorganisms in the product itself), carrying out microbiological challenge tests (design of a MCT, inoculating product with test organisms), an example of microbiological challenge testing: safety and stability of vacuum packed cooked potatoes. 15 references. SRA

624

Mayer-Miebach (E). **Food irradiation - a means of controlling pathogenic microorganisms in food.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 493-497

Salmonella enteritidis, *S. typhimurium*, *Campylobacter jejuni* and *Listeria monocytogenes* frequently cause foodborne infections. Food of animal origin, especially poultry, poultry products, eggs and egg products are main sources of contamination. To ensure hygienic quality of these products, it is necessary to take protective measures - not only of a hygienic nature. Food irradiation is one of the protective methods available. Comprehensive data concerning sensory, physiological and toxicological characteristics of irradiated food exist. However, to determine eventual sources of risk associated with the inappropriate use of radiation, it is necessary to generate additional comprehensive microbiological and engineering data for all foods concerned. Finally, predictive modelling will contribute considerably to the solution of the overall problem. 51 references. AA

Algae

Palmaria palmata

625

Lahaye (M), Michel (C) and Barry (JL). **Chemical, physiochemical and in vitro fermentation characteristics of dietary fibers from *Palmaria palmata* (L.) Kuntze.** *Food Chemistry* 47(1); 1993; 29-36

P. palmata (marine red algae, also known as dulse) contains 33.2 - 33.5% total dietary fibers. The yield of soluble fibres by simulated digestive tract conditions was lower (12.2%) than by the enzymatic/gravimetri method (18.9%). All soluble fibre fractions consisted of linear β-1, 4/β1,3 mixed linked xylans containing similar amounts of 1,4 linkages (70.5 - 80.2%). The insoluble fibres contained essentially 1,4 linked xylans with some 1,3 linked xylose and a small amount of 1,4 linked glucose (cellulose). Low intrinsic viscosities were measured from the soluble fibres (49.4 - 97.0 ml g^{-1}) and water holding capacities of dry dulse particles of 4.3 and 4.7 g g^{-1} were measured in buffer at pH 3.0 and 7.3 respectively. Soluble fibres are fermented within 6 h by human faecal bacteria into short chain fatty acids. SD

Bacteria

626

Manja (KS) and Sankaran (R). **Methods for determining bacterial populations in foods and food products: A critical evaluation.**

Journal of Food Science and Technology (India) 31(1); 1994; 1-10

This review critically analyses the methods for estimating bacterial populations in foods and discusses the rapid methods for food quality. The advantages and limitations of the methods are delineated. 109 references. SD

Clostridium sporogenes

627

Bowles (BL) and Jay (JM). **The effect of phenylglyoxal on *Clostridium sporogenes*.** *Food Microbiology* 10(2); 1993; 113-121

In general phenylglyoxal (PG) was found to inhibit anaerobic bacteria, with strict anaerobes being more affected than facultatives. The susceptibility of *Cl. sporogenes* vegetative cells to PG varied with the type of medium (20 - > 10,000 μg ml^{-1} PG), pH (20 - > 2500 μg ml^{-1} PG), and incubation temp. (625 - > 1250 μg ml^{-1} PG). However, optimum vegetative (20 μg ml^{-1} PG) and spore (< 1.0 μg ml^{-1} PG) inhibitions occurred in cooked meat medium for all conditions tested. PG was most active against vegetative cells at pH values > 7.5 and at temp. between 25-30°C. The compound inhibited sporogenesis (156 μg ml^{-1} PG) and replication processes (29 μg ml^{-1} PG), as well as deoxyribonuclease activity (4.28 μg ml^{-1} PG). Increased concn. of free α-amino acids and sulfhydryl-containing compounds antagonized the activity of PG against vegetative cells. Antigerminative effects appeared to occur optimally at low pH, and the heat resistance of *Cl. sporogenes* spores was reduced. Furthermore, PG concn. of 10 - 0.63 μg ml^{-1} prevented germination of *Cl. sporogenes* spores in 5 commercial soups and maintained their organoleptic qualities for 35 days at 30°C. AA

Pseudomonas fluorescens

628

Willocx (F), Mercier (M), Hendrickx (M) and Tobback (P). **Modelling the influence of temperature and carbon dioxide upon the growth of *Pseudomonas fluorescens*.** *Food Microbiology* 10(2); 1993; 159-173

In a temp. range of 4 to 12°C the lag time of *Ps. fluorescens* showed an exponential dependence with temp., whereas a linear relationship of max. absolute growth rate with temp. was observed. CO_2 was shown to be effective against the proliferation of aerobic psychrotropic γ-negative bacteria by principally increasing the lag phase and to a lesser extent the generation time. The dependence of the lag time and the max. absolute growth rate of *Ps. fluorescens* with the CO_2 concn. (0.03 - 15%, with an excess of O_2) was described using an exponential function. The effectiveness of the inhibition increased with decreasing temp. SRA

Salmonella

629

Todd (ECD), Mackenzie (JM) and Peterkin (PI). **Development of an enzyme-linked antibody hydrophobic grid membrane filter method for detection of *Salmonella* in foods.** *Food Microbiology* 10(2); 1993; 87-99

An enzyme-linked antibody hydrophobic grid membrane filter (ELA-HGMF) method was developed using M105 monoclonal antibody and EF-18 as a selective agar. 121 foods, feeds, animal by-products and feces were assayed using this method with the Health Protection Branch Standard Cultural Method as a reference procedure. 53 samples were positive for *Salmonella* by both procedures, and strains were isolated from 2 samples by the ELA-HGMF method alone. An attempt to shorten the time for enrichment from 24 to 6 h decreased the sensitivity of the method, and this modification was not pursued. The main advantage of the ELA-HGMF method is the relative ease of selection of *Salmonella* growth from the HGMFs. The use of ELA stain to detect the organisms on HGMFs enabled detection of a positive sample in 5 days and negative samples were detected within 4 days. SRA

Fungi

Mushrooms

630

Soumya Roy, Anantheswaran (RC), Shent (JS), Westerhaus (MO) and Beelman (RB).

Determination of moisture content of mushrooms by vis-NIR spectroscopy. *Journal of the Science of Food and Agriculture* 63(3); 1993; 355-360

Feasibility of the detn. of the moisture content of intact individual mushrooms (*Agaricus bisporus*) by visible and near infrared reflectance spectroscopy (Vis-NIR) was studied. The convection drying method was found to be suitable to obtain reference values for the calibration equation. The standard error of the lab. procedure ranged from 0.16 to 0.42%. Modified partial least square regression was used to develop the calibration equations. The importance of different segments of wavelength, the effect of light scattering and the use of data processing on the prediction of moisture content were evaluated. The equation obtained using the wavelength segment 600-2200 nm with first derivative and scatter correction had the best performance with a standard error of cross validation of 0.64%. This equation performed very well when validated using a separate set of mushrooms of the same kind as those in calibration set. This equation, however, did not perform well when using mushrooms from a different treatment. Accuracy of prediction was re-established by adding typical spectra from the second group of mushrooms to the calibration set and performing recalibration. AA

631

Kompany (E) and Rene (F). **Aroma retention of cultivated mushrooms (*Agaricus bisporus*) during the freeze-drying process.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 524-528

The retention of 5 major flavour components of cultivated mushrooms during freeze-drying was studied and the effect of process conditions on the kinetics of loss of these components was investigated. The loss of volatiles was independent of the volatility of the compound and the relative loss observed for 1-octen 3-ol was more important than that of other components, whatever the operating conditions. Optimum freeze-drying conditions were outlined for a max. retention of flavour components in the dry product. 1-octen 3-ol is considered as the most important mushroom flavour. From the study of retention of this component the optinum operating conditions with a varying heating plate temp. and chamber pressure were outlined. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

632

Wedzicha (BL), Goddard (SJ) and Zeb (A). **Approach to the design of model systems for food additive-food component interactions.** *Food Chemistry* 47(2); 1993; 129-132

The rates of reactions between food additives and food components are affected by concn., ionic strength, non-electrolytes, pH, surfactants and solute transport. All these variables must be considered in the design of model systems. The importance of the medium to the progress of test reactions is illustrated and critically appraised. AA

Colourants

633

Biswas (G), Sarkar (S) and Chatterjee (TK). **Surveillance on artificial colours in food products marketed in Calcutta and adjoining areas.** *Journal of Food Science and Technology (India)* 31(1); 1994; 66-67

Toffees, biscuits, cakes, pastries, fried snacks, milk based sweets, besan and wheat based sweets, ready-to-serve beverages, beverage concentrates, ice candy, ice-cream, jam, jelly and custard powder products from Calcutta market were analysed for added synthetic colouring matters. The quantities of permitted colours in 93.4% of the products were within the range of 18-220 p.p.m. Foods made (6.6%)

by itinerant vendors, unorganised sectors, small and cottage scale industries contained non-permitted colours and colours above permissible limits. SD

CEREALS

634

Jideani (AI) and Akingbala (JO). **Some physicochemical properties of acha (*Digitaria exilis* Stapf.) and iburu (*Digitaria iburua* Stapf.) grains.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 369-374

Some physicochemical properties of 2 cultivated species of *Digitaria* (*D. exilis* and *D. iburua*) were studied. Physical properties such as 1000-kernel wt., kernel size and water absorption rate of the grains were determined. Water absorption by both cereals exhibited a 2-stage pattern of swelling and solubility properties similar to other non-waxy cereal starches. Starch from acha swelled less than iburu, 7.3 compared with 7.8 for iburu. Chemical constituents such as protein, oil, crude fibre, ash, nitrogen-free extract and amylose were also determined. An amylose content of 280 g kg^{-1} was obtained for both cereal starches. Barbender amylograms obtained from starch and flour were typical of most normal, non-waxy cereals. Maize starch had relatively higher hot-paste and cold-paste viscosities than starches of the the 2 *Digitaria* species. AA

635

Grover (K), Sadana (BK) and Hira (CK). **Availability of trace minerals from cereal preparations.** *Indian Food Packer* 48(2); 1994; 39-44

The samples of whole wheat flour, refined wheat flour, semolina, broken wheat, whole maize flour, corn grains and rice were procured from 5 different locations in Ludhiana District, Punjab, India. Among all, the whole wheat flour was found to be the best source of trace minerals. The availability of trace minerals from chapatis and parantha was higher compared to other cereal preparations viz. puri, bread, biscuits, matter, halwa, dalia, maize chapati and popcorn. The availability of Zn was max. and that of Fe was min. The total mineral content was higher in maize chapati while the % availability was observed to be higher in popcorn. AA

636

Rouanet (JM), Laurent (C) and Besancon (P). **Rice bran and wheat bran. Selective effect on plasma and liver cholesterol in high-cholesterol fed rats.** *Food Chemistry* 47(1); 1993; 67-71

Plasma and liver cholesterol concn. were measured in Sprague-Dawley rats fed high-cholesterol (1% w/w) semipurified diets containing various fibre sources (10% w/w) for 21 days. The dietary contents of fibre were constant among the diets, except for the control diet which was devoid of fibre source. Rice bran (either crude or parboiled) produced lower plasma LDL cholesterol concn. than wheat bran. The content of liver cholesterol in rats fed rice bran diets was significantly lower than in rats fed the wheat bran diet. When comparing the compositions of the fibre sources, this study suggests that, apart form the polyunsaturated fatty acids of rice bran, the observed effects are mainly attributable to high soluble fibre content. AA

637

Corbini (G), Biondi (C), Proietti (D), Dreassi (E) and Corti (P). **Polarographic determination of total pyrethroid residues in stored cereals.** *Analyst (London)* 118(2); 1993; 183-187

A new method for detn. of the total cyanopyrethroid residue concn. in stored cereals by differential-pulse polarography is proposed. Cyanopyrethroids were previously extracted with a non-polar solvent and purified by solid-phase extraction. The total pyrethroid residue concn. are determined by differential-pulse polarography of 3-phenoxybenzaldehyde formed quantitatively by rapid and reproducible alkaline alcoholysis of the sample. The method is linear, quantitative and reproducible for maize and wheat analysis in the range 0.1 - 3.0 mg kg^{-1}. A TLC method for identification of 6 widely used cyanopyrethroids in the sample is described. The elctrodic reduction process of

3-phenoxybenzaldehyde is examined and the reduction products isolated and identified. AA

638

Chan (K-Y) and Wasserman (BP). **Direct colorimetric assay of free thiol groups and disulphide bonds in suspensions of solubilized and particulate cereal proteins.** *Cereal Chemistry* 70(1); 1993; 22-26

A direct colorimetric method that simultaneously combines measurement of solubilized and insoluble thiol groups and disulphide bonds in corn meal-based materials is described. Ellman's reagent, 5,5'-dithiobis (2-nitrobenzoic acid), which reacts specifically with thiol groups, or disodium 2-nitro-5-thiosulfobenzoate, which reacts with cysteine and thiol groups formed after reduction of disulphide bonds with sodium sulphite, were reacted directly with corn meal in the presence of surfactants (urea and/or sodium dodecyl sulphate), releasing the soluble chromophore 2-nitro-5-thiobenzoate. After a clarification step to remove suspended material, absorbance at 40 mesh and dried amino acid analysis. Twin-screw extrusion of corn meal at 150°C at moisture levels of 16 and 18% had no significant effect on cysteine or disulphide bond levels. Other possible changes such as disulphide bond rearrangements could not be determined by the mixed-phase assay. This method provides a rapid and convenient means for screening thiol and disulphide levels in insoluble proteinaceous materials. AA

639

Chan (K-Y) and Wasserman (BP). **Rapid solid-phase determination of cereal protein using bicinchoninic acid.** *Cereal Chemistry* 70(1); 1993; 27-28

A modification of the bicinchoninic acid (BA) assay that can be used for the rapid detn. of protein in cereal-based materials is described. Samples are directly suspended in BA reagent, where under sonication the protein undergoes reaction and a soluble purple chromophore is released. After a clarification step, absorbance readings are obtained and protein quantified by comparison with a standard curve. In the various corn-derived fractions tested, the solid-phase assay was linear with the amount of sample added, and high reproducibility was observed between replicates. With two commercially prepared flours (Micro-Crisp and Pure n Thick), direct comparisons with the Kjedahl assay showed general agreement. In two other samples (corn meal and zein), higher readings, possibly derived from the contribution of nonprotein N, were obtained by the Kjeldahl assay, especially when numerous insoluble proteinaceous materials require screening. AA

640

Rybka (K), Sitarski (J) and Raczynska-Bojanowska (K). **Ferulic acid in rye and wheat grain and grain dietary fiber.** *Cereal Chemistry* 70(1); 1993; 55-59

The aim of the present work was to examine the effect of cross-linking of rye and wheat arabinoxylan by ferulic acid on grain nutritive value, measured *in vitro* by an enzymatic test. Detn. of ferulic acid was based on spectrophotometric measurements of defatted samples at 320 nm. Approx. 80% of the *trans*-ferulic acid, the dominant phenolic acid of rye and wheat grain, was found in the bran of both species. Total content and extractability of free and esterified ferulic acid by water, ethanol, and alimentary enzymes (soluble dietary fiber) from grain meal were significantly higher in rye than in wheat. The activity of peroxidase, the enzyme thought to be responsible for the formation of diferulic bridges, was also significantly higher in rye. Most (85-90%) of the alkaline-soluble ferulic acid in grain was localized in the insoluble dietary fiber, and only about 5% was in the soluble fraction. Inspite of the higher solubility of rye arabinoxylans and the higher arabinose:xylose ratio in rye than in wheat grain, the ratio of the number of arabinose residues per ferulic acid molecule was not significantly higher in the soluble fiber of rye. Thus, cross-linking of grain hemicellulose components by ferulic bridges does not appear to contribute to the known differences in the structure, mol. wt., and nutritive properties of soluble fiber of rye and wheat. AA

641

Bhatty (RS). **Extraction and enrichment of (1-3),(1-4)-β-D-glucan from barley and oat brans.** *Cereal Chemistry* 70(1); 1993; 73-77

β-Glucan was extracted and purified from Tupper barley bran (6.6% β-glucan), Azhul barley bran (13.4% β-glucan), and commercial oat bran (6.9% β-glucan) with solvent 1 and, in the case of Azhul barley bran, with two additional solvents (2 and 3). Solvent 1 was distilled water adjusted to pH 10 with 20% sodium carbonate, solvent 2 was distilled water adjusted to pH 7, and solvent 3 was 4% (w/v) sodium hydroxide. Solvent 1 extracted 61-64% of the total β-glucan from the barley brans and 70% from oat bran; solvents 2 and 3 extracted 72 and 84%, respectively, from Azhul barley bran. The final yields, in percent β-glucan recovered from barley brans, were solvent 1, 52-55%; solvent 2, 40%; solvent 3, 81%. The yield from oat bran with solvent 1 was 61%. The purified preparations contained 72-81% β-glucan + pentosans from barley brans and 84% from oat bran, expressed on an ash-free basis. They also contained 0.2-0.5% total nitrogen, 0.4-1.2% starch, 1.1-10.9% pentosans, and 3.7-12.6% ash. Ether extract was not detected in any of the preparations. Enrichment index, calculated by percent yield X (percent β-glucan + pentosan, ash-free basis)/100, was highest for solvent 3 (65), lowest for solvent 2 (33), varied from 38 to 51 for solvent 1. Sodium hydroxide (solvent 3) appeared to be a better solvent for extraction and purification of β-glucan from barley bran. Size-exclusion chromatography of the 3 β-glucan preparations from Azhul barley bran suggested an apparent mol. wt. of about 2×10^6. Mol. wts. of the preparations were not correlated with their flow viscosity. AA

Barley

642

Gupta. M. and Khetarpaul (N). **Effect of rabadi fermentation on phytic acid and *in vitro* digestibility of barley.** *Die Nahrung* 37(2); 1993; 141-146

Rabadi, an indigenous fermented food, was prepared by mixing cereal flour with butter milk, allowing it to ferment at 30, 35 and 40°C for 6, 12, 18, 24 and 48 h and cooking the fermented mixture for 0.5 h with continuous stirring. Two types of *rabadi* were prepared i.e. autoclaved and unautoclaved. In autoclaved type of *rabadi* cereal flour was mixed with water, autoclaved (0.103 MPa = 15 psi for 15 min), cooled, mixed with buttermilk and fermented. As this type of *rabadi* was precooked prior to fermentation, hence, the fermented product did not require cooking afterwards, while in unautoclaved *rabadi*, barley flour and buttermilk were mixed, fermented and then cooked prior to consumption. Phytic acid was reduced drastically at all the temp. and periods of fermentation in both autoclaved and unautoclaved type of *rabadi*; greater reduction occurred at higher temp. and duration of fermentation. A significant improvement in the *in vitro* digestibility of starch and protein was observed, max. improvement was noticed when fermentation was carried out at 40°C for 48 h in both the types of *rabadi*. Phytic acid had a significant ($P < 0.05$) negative correlation with digestibility (*in vitro*) of proteins and starch of barley flour *radabi*. AA

Oats

643

Inglett (GE). **Amylodextrins containing β-glucan from oat flours and bran.** *Food Chemistry* 47(2); 1993; 133-136

Amylodextrins with soluble β-glucan contents as high as 10% were prepared from milled oat flours and bran. The level of enzymatic conversion was measured by HPLC and gel permeation chromatography. The large mol. wt. amylodextrin fragments containing the β-glucan from low level amylolytic conversions were measured by gel permeation chromatography. The different elution times of the two separate enzyme conversion mixture components suggest different modes of enzyme actions. Lower mol. wt. fractions are produced by the action of *Bacillus licheniformis* α-amylase in contrast to the action of *B. stearothermophilus* α-amylase, due possibly to dissimilar enzyme dosages. Comparisons of the amylodextrin compositions produced by *B. stearothermophilus* α-amylase and *B. licheniformis* α-amylase systems at intermediate conversion levels revealed that the *B. stearothermophilus* α-amylase gave much larger quantities of the maltohexaose component than the *B. licheniformis* α-amylase. AA

Rice

644

Resurreccion (AP), Li (X), Okita (TW) and Juliano (BO). **Characterization of poorly digested protein of cooked rice protein bodies.** *Cereal Chemistry* 70(1); 1993; 101-104

Poorly digested protein bodies from cooked IR58 milled rice were prepared by destarching with *Aspergillus oryzae* α-amylase followed by one or two pepsin treatments. The preparation was further purified by gel filtration through a Bio-Gel A-5m column with 0.5% sodium dodecyl sulphate in 0.05M Tris-HCl (pH 8.6) buffer as eluant. The major polypeptide had a high sulphur amino acid content and a molecular size of about 13-kDa, slightly smaller than that of the 15-kDa rice prolamin. The 13-kDa polypeptide was identified as a prolamin based on Western blot analysis, and it is probably a proteolytic product of the class of 15-kDa rice prolamins that are rich in sulphur-containing amino acids. AA

Wheat

645

Bettge (AD) and Pomeranz (Y). **Air-aspirated cleaning to separate sound from preharvest-sprouted wheat.** *Cereal Chemistry* 70(1); 1993; 36-41

An air-aspirated wheat cleaner fractionated two sets of preharvest-sprouted wheats (falling numbers 62-376) through the combined influences of aerodynamic drag, kernel vol., and kernel wt. One set was fractionated at a water column (WC) air pressure of 3.81 cm (1.5 in); the other set was fractionated under WC air pressures of 2.54, 3.81 and 5.08 cm (1, 1.5 and 2 in., respectively). Each treatment resulted in a lifted fraction and a fraction passing through the air-aspirated cleaner. The fractions, plus the original grain, were analyzed for physicochemical, α-amylase, and end-use parameters. The first set of samples showed significant physical and physicochemical differences between lifted and throughs fractions. The improvements were most meaningful for wheats of moderate preharvest sprouting (falling numbers between 200 and 300). Throughs fractions produced better sponge cakes, in vol. and texture, than the other fractions. The second set of samples exhibited a similar pattern: significant improvement in wheat of moderate preharvest sprouting but no meaningful improvements in either highly or lightly sprouted samples. Significant improvement was observed in fractions passing through the aspirator relative to the original and to the lifted fractions in samples of moderate preharvest sprouting. This improvement was most evident in the fraction passing through the aspirator at 5.08 cm WC air pressure. Aspiration at this air pressure causes about 50% of the sample to be removed. AA

646

Hatcher (DW) and Kruger (JE). **Distribution of polyphenol oxidase in flour millstreams of Canadian common wheat classes milled to three extraction rates.** *Cereal Chemistry* 70(1); 1993; 51-55

Polyphenol oxidase (PPO) levels were determined on individual and pooled millstreams of 5 cvs representative of 5 different classes of Canadian wheat. The wheats were milled on a pilot mill to extraction rates of approx. 75 (conventional), 80 and 85%. Enzyme activity in individual streams ranged widely by increased with increasing bran contamination in the millstreams. With the exception of the soft spring wheat cv., PPO levels, as a percentage of total activity, were similar for the different wheats at similar cumulative flour yield. Less than 10% of the total PPO activity was present in cumulative flour streams corresponding to 70% extraction, after which the amount of the enzyme rapidly increased. Slightly more PPO activity appeared in the lower ash streams if the wheats were milled to a higher extraction using this mill flow. PPO activity was linearly correlated with ash content (up to 2.0% ash) and flour grade colour figure (up to 5 units). AA

647

Kaldy (MS), Kereliuk (GR) and Kozub (GC). **Influence of gluten components and flour**

lipids on soft white wheat quality. *Cereal Chemistry* 70(1); 1993; 77-80

Soft white wheat flours from varied growing conditions were analyzed for selected variables of gluten and components of flour lipid to identify those that are associated with baking quality as measured by cookie diam. and cake vol. Statistical analysis indicated that among the gluten variables, yield of gluten and pentosan in gluten were the variables most associated with cookie diam. corrected for protein content. However, when the correction for protein content was not taken into account, total protein was shown to be negatively correlated with cookie diam. Among the components of flour lipid, polar lipid had the highest correlation with cake vol. These variables, therefore, appear to be important in the end-use quality of soft white wheat. AA

648

Symons (SJ) and Dexter (JE). **Relationship of flour aleurone fluorescence to flour refinement for some Canadian hard common wheat classes.** *Cereal Chemistry* 70(1); 1993; 90-95

Millstreams from pilot-scale millings of commercially grown wheats from the Canadian hard common wheat classes Canada Western Red Spring, Canada Prairie Spring, Canada Western Red Winter, and Canada Western Utility were used to evaluate the potential of fluorescence imaging of aleurone tissue as a flour refinement indicator. Flour aleurone fluorescence was measured using UV excitation (excitation 365 nm, barrier > 420 nm). Aleurone fluorescence is acknowledge to be due to ferulic acid, which is highly concentrated in aleurone cell walls. In the current study, for every wheat class examined, aleurone fluorescence was highly correlated with ferulic acid content for every millstream with the exception of bran finisher flour. Bran finisher flour gives a moderate aleurone fluorescence despite a high level of ferulic acid. For all wheat classes, break flours gave a distinctly lower aleurone fluorescence than did reduction flours of comparable ash content and colour; the former have a lower aleurone content on the basis of ferulic acid content. Aleurone fluorescence had good potential for on-line monitoring of mill performance because it is strongly related ($P < 0.01$) to the ash content and brightness of reduction flours, a primary determinate of mill efficiency, for all wheat classes. The relationships of aleurone fluorescence to flour ash content and flour colour were homogenous for Canada Western Red Spring wheats from three crop years and two locations but were heterogeneous between wheat classes. AA

649

Wong (JH), Kobrehel (K), Nimbona (C), Yee (BC), Balogh (A), Kiss (F), Buchanan (BB). **Thioredoxin and bread wheat.** *Cereal Chemistry* 70(1); 1993; 113-114

650

Srivastava (AK) and Haridas Rao (P). **Changes in the functional characteristics of wheat during high temperature storage.** *Journal of Food Science and Technology (India)* 31(1); 1994; 36-39

Storage of wheat at different temp. showed considerable deterioration in grain quality. The deterioration was more in wheat stored for 5 months at 50°C. Storage of wheat at higher temp. for longer duration decreased both the 1000 kernel and hectolitre wts. Duration of storage also adversely affected the milling yield. Increases in colour grade value and ash content in flour were observed with increases in storage temp. and time. Storing of wheat at higher temp. affected the α-amylase activity and this was indicated by an increase in falling number and amylograph peak viscosity values. Rheological studies showed a decrease in farinograph water absorption and an increase in resistance to extension in wheat stored for 5 months at 50°C. Baking tests revealed that, even though the quality of bread improved to some extent in wheat stored at 27 and 37°C, storage of wheat at 50°C considerably reduced the bread quality. AA

Wheat flour

651

Sharma (N), Hanna (MA) and Chen (YR). **Flow behaviour of wheat flour-water dough using a capillary rheometer. I. Effect of capillary geometry.** *Cereal Chemistry* 70(1); 1993; 59-63

A capillary extrusion rheometer was employed for detailed investigation of the flow behaviour of wheat flour-water dough. Dough was extruded at ambient conditions through capillaries of different lengths and diam. In the shear rate of 9-5,000 sec^{-1}, the dough exhibited shear thinning with an average flow behaviour index of 0.34 and consistency coeff. of 2, 395 Pa-sec$^{0.34}$. The flow curves, corrected for end effects and for effect of die diam. on shear rates, were independent of capillary dimensions. The capillary rheometer technique was found to be a reliable and repeatable method for determining flow parameters of viscous materials such as dough. AA

652

Sharma (N), Hanna (MA) and Marx (DB): **Flow behaviour of wheat flour-water dough using a capillary rheometer. II. Effects of water, protein, mix and rest time.** *Cereal Chemistry* 70(1); 1993; 63-67

Doughs made with various combinations of water, protein, and mix and rest times were extruded at ambient temp. through a capillary of known geometry. The flow behaviour of the doughs was described by a power law model. The consistency coeff. decreased with increasing water content in the doughs, but it increased with increasing protein content. Mix and rest times did not show a significant effect on the consistency coeff. The flow behaviour indices were not affected by water, protein, mix time, or rest time over the ranges studied. The consistency coeff. were predicted within reasonable accuracy by a quadratic model including only water and protein as independent variables. The quantification of flow properties could be used for quality control using automated process control in bakeries of the future. AA

653

Graybosch (R), Peterson (CJ), Moore (KJ), Stearns (M) and Grant (DL). **Comparative effect of wheat flour protein, lipid, and pentosan composition in relation to baking and milling quality.** *Cereal Chemistry* 70(1); 1993; 95-101

Variation in milling, baking and dough-handling properties among 58 hard wheat (*Triticum aestivum*) flours was examined in relations to the variation in flour protein and lipid concn. and composition and the variation in water-soluble pentosan concn. Simple correlations showed no single biochemical component capable of explaining more than 41% of the variation in any given quality parameter. Similarly, no single biochemical component was highly related to all quality attributes. Canonical analyses, a multivariate statistical approach, revealed that the measured biochemical components were able to explain more than 90% of the variation in major quality attributes such as dough-handling and loaf characteristics. Flour protein concn. was found to be the primary factor contributing to variation in both dough strength and loaf characteristics. Once the primary effects of protein concn. were established, flour polar lipid concn. showed substantial positive contributions to dough handling. Loaf textural features largely unrelated to protein concn.; however, glutenin concn., water-soluble pentosans, and flour lipids showed positive relationships. Assay of numerous biochemical components together with multivariate approaches may be needed to develop effective predictive models for observed variation in wheat end-use quality. AA

MILLETS

Corn

654

Vaidya (PS), Nigam (SN) and Jaiswal (PK). **Assesment of aflatoxin (B_1) in maize in Nagpur market.** *Beverage and Food World* 21(1); 1994; 15

Twenty maize samples were analyzed for aflatoxin B_1 contamination. 6 samples contained aflatoxin B_1 in the range of 16.0 p.p.b. to 24.0 p.p.b. Only 1 sample contained aflatoxin B_1 as 31.2 p.p.b. which is beyond the max. permissible limit of 30 p.p.b. 13 samples were found free from aflatoxin. SRA

655

Hu (L), Hsieh (F) and Huff (HE). **Corn meal extrusion with emulsifier and soybean fiber.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 544-551

Twin-screw extrusion of corn meal with monoacylglycerol (MAG) and soy fiber was investigated. The treatment variables studied were MAG and soy fiber contents, screw speed, and feed rate. MAG addition reduced torque, specific mechanical energy, and dough temp., but increased die pressure. The significant increase in die pressure was caused by an increased length in filled flights. Die pressure and dough mass temp. increased with soy fiber addition at lower MAG contents (< 0.4 g/100 g). The trends were reversed at higher MAG contents (> 0.4 g/100 g). Moreover, MAG-starch complexation increased with MAG addition but was impeded by soy fiber addition. AA

656

Dombrink-Kurtzman (MA) and Bietz (JA). **Zein composition in hard and soft endosperm of maize.** *Cereal Chemistry* 70(1); 1993; 105-108

Maize protein composition and distribution may directly influence endosperm texture and physical properties. To test this hypothesis, the compositions of alcohol-soluble proteins in maize endosperm was compared with the hard and soft fractions of 8 normal genotypes. Kernels were hand-dissected to obtain fractions differing in texture. Endosperm fractions were extracted with a sol. containing alcohol, reducing agent, and sodium acetate and were analyzed by sodium dedecyl sulphate-polyacrylamide gel electrophoresis and by the reversed-phase HPLC. More (an av. of 3.3 times) α-zeins (19 and 22 kDa) was found in hard endosperm fractions than in soft endosperm fractions. In contrast, soft endosperm fractions contained nearly twice as much 27-kDa γ-zein (based on percent) than did hard endosperm fractions. Thus, distribution of the various types of zeins was not uniform throughout the maize endopserm. The results suggest that the zein composition of protein bodies in normal maize kernels may be correlated with texture of the endosperm from which the sample was obtained. AA

657

Paul (MC) and Mishra (RR). **Effect of fungal infestation on the starch, lipids and dry weight of maize seeds.** *Journal of Food Science and Technology (India)* 31(1); 1994; 52-54

Infestation of 3 var. of maize (*Zea mays* L.) by 6 dominant maize seed fungi viz. *Alternaria alternata*, *Aspergillus flavus*, *Fusarium moniliforme*, *Penicillium expansum*, *Rhizopus nigricans* and *Trichoderma viride*, resulted in the reduction in dry wt., increase in fat acidity and depletion of starch. *Asp. flavus* increased fat acidity in 'Local White' var. and 'Vijay' (53.5% and 69.2%) and *P. expansum* in 'VL-16' var. (74.2%), after 30 days of incubation. Starch depletion was found to be slow during the initial phase of incubation, but became pronounced after 30 days of incubation. *Asp. flavus* showed max. depletion of starch (48.5%) and *A. alternata* the least (25.3%). Highest reduction in dry wt. of the seeds was in case of *Asp. flavus*. AA

Corn starch

658

Huang (JJ) and White (PJ). **Waxy corn starch: Monoglyceride interaction in a model system.** *Cereal Chemistry* 70(1); 1993; 42-47

The interaction between waxy corn starch and monoglyceride (MGs) (monolaurin, monomyristin, monopalmitin, and monostearin) was investigated by the measurement of starch-MG complex formation, iodine affinity, differential scanning calorimetry, and texture measurements in model systems. All MGs formed some amount of complex with waxy corn starch, but no significant differences occurred among the MG types. Iodimetric titrations of the complexes also showed that the presence of MGs significantly decreased the iodine affinity of the amylopectin when compared with that of the control. Gelatinization and retrogradation behaviour of starch-MG mixtures were measured by using differential scanning calorimetry. Compared with that of the control, the gelatinization onset temp. decreased significantly in the presence of MGs, except for monostearin; moreover, statistically lower enthalpies were noted for the treatments containing MGs, except for the treatment with monomyristin. After retrogradation, the enthalpies of recrystallized starch for systems containing monolaurin, monomyristin, and monopalmitin were statistically lower than that of the control. Gel firmness and cohesiveness measurements with the Voland-Stevens texture analyser revealed little patterns in the effects of MGs on waxy maize starch gelatinization. AA

659

Yuan (RC), Thompson (DB) and Boyer (CD). **Fine structure of amylopectin in relation to gelatinization and retrogradation behaviour of maize starches from three wx-containing genotypes in two inbred lines.** *Cereal Chemistry* 70(1); 1993; 81-89

Pearl millets

660

Kumar (A) and Chauhan (BM). **Chemical composition and utilization of pearl millet sprouts.** *Die Nahrung* 37(4); 1993; 356-363

Pearl millet (*Pennisetum typhoideum*) grains were germinated at 25°C (48, 54 and 60 h), 30 and 35°C (36, 42 and 48 h) to obtain a desirable size of sprouts. The sprouting improved total protein, ash, ascorbic acid, total soluble sugars, reducing sugars, non-reducing sugars and fibre content and diminished starch and fat. The sprouts, when incorporated in various foods including salad, weaning foods, biscuits, cake and *rabadi* (an indigenous fermented food), were found to be acceptable. BV

661

Chavan (JK) and Kachare (DP). **Effect of seed treatment on lipolytic deterioration of pearl millet flour during storage.** *Journal of Food Science and Technology (India)* 31(1); 1994; 80-81

Pearl millet seeds were subjected to soaking in dilute acid sol. (0.05 N HCl), dry-heating (50°C for 60 min or 100°C for 10 min) and boiling water-blanching (98°C for 30 sec) treatments, before grinding to flour. The changes in fat acidity in the flour during storage at ambient temp. were monitored. Boiling water-blanching treatment was found to completely arrest the development of the fat acidity in the flour, during 30 days storage at ambient temp. The acid-soaking of seeds was partially effective, while the dry-heating of seeds was found to be totally ineffective for this purpose. AA

662

Sainani (MN), Gupta (VS), Mishra (VK), Lachke (AH), Ranjekar (PK), Pillay (DTN). **Effect of chemical modification on some structural and functional properties of pennisetin, a major seed storage protein from pearl millet.** *Phytochemistry* 34(4); 1993; 919-925

Nine different types of amino acids of pennisetin, a major storage protein in pearl millet, were modified separately and the effect of this modification was assessed by determining certain structural and functional properties. With modification of histidine, tyrosine, methionine and cysteine, there was an increase in intrinsic viscosity (η) from 16.8 to 20.5 mlg^{-1} while that of serine led to a decrease (η) from 16.8 to 14.9 mlg^{-1} indicating alteration in the molecular dimensions of pennisetin. The CD spectra of pennisetin modified at serine, lysine, methionine and cysteine residues showed changes in molar ellipticity values reflecting some changes in its secondary structure. The water holding capacity of pennisetin showed a max. increase in the case of serine modification (1.76-4.32 g of H_2Og^{-1} of pennisetin) and a max. decrease in lysine modification (1.76-1.26 g of H_2Og^{-1} of pennisetin). The thermostability of pennisetin remained unaffected with modification of amino acids except in the case of glutamic and aspartic acid. This is the first report where a specific seed storage protein of an important food crop is chemically modified and its effects are studied with respect to its structural and functional properties. AA

Ragi

663

Singh (D), Chauhan (GS), Verma (NS) and Tyagi (SM). **Physical, chemical and milling characteristics of ragi varieties.** *Bulletin of Grain Technology* 31(1); 1993; 61-66

Twelve var. of ragi (*Eleusine coracana*) viz., early maturing (PES-144, $T_{56}B$, T_{25-1}); medium maturing (VL-101, PES-176, PM-4, HR 374, PES-224) and late maturing (PES-110, PR-202, HR-45, PR-1044) were studied for their physical, chemical and milling characteristics. 1000 kernels (grains) wt. and the diam. of these var. ranged between 2.16 - 5.00 g and 1.33 - 1.60 mm, respectively. Var. T_{25-1} ranked first in protein and crude fiber, VL-101 in fat, PR-202 in carbohydrate and P, HR-43 in ash and PM-4 in Ca content. Conditioning at 16.5% moisture level was found to be optimum for optimal flour yield with min. colour values. The yield of various fractions of the flour in different var. were found to be directly proportional to the total flour yield. Overall, the var. in late maturing group yielded max. % of flour followed by the medium and early maturing groups. It was interesting to note that within various maturity groups the colour values were generally inversely proportional to the flour yield. AA

PULSES

664

Oshodi (AA) and Hall (GM). ***In vitro* multienzyme digestibility of protein of some plant source flours blended with bovine plasma protein concentrate.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 323-327

The *in-vitro* multienzyme protein digestibilities of the flours of maize, cassava, pigeon pea (*Cajanus cajan*), African yambean (*Sphenostylis stenocarpa*) and bambara groundnut (*Vigna subterranea*), blended with bovine plasma protein concentrate were investigated. The multienzyme system consists of trypsin, chymotrypsin and peptidase. It was found that the addition of bovine plasma protein concentrate improved the protein digestibility of the flours compared with flours without the additive. The digestibilities were increased by between 3% in bambara groundnut blended flour to about 10% in cassava blended flour. When the flours were wet-heat treated, the digestibilities further increased in all samples with increments between 7.5% in bambara groundnut and 16.6% in cassava flour. Bovine plasma protein concentrate may be a good source of protein for the fortification of protein-deficient foods, particularly maize and cassava flours. AA

665

Rajni Modgil and Usha Mehta. **Protein and methionine content of pulses infested with *Callosobruchus chinensis* (L.) (bruchids).** *Die Nahrung* 37(2); 1993; 170-172

The present study was concerned with the changes in the levels of crude protein, true protein and methionine in 3 commonly consumed pulses (Bengal gram, green gram and red gram) at 6 different levels of *C. chinensis* (L) infestation. BV

666

Rajni Modgil and Usha Mehta. **The effect of different levels of *Callosobruchus chinensis* (L.) infestation on B-vitamins and mineral content of pulses.** *Die Nahrung* 37(2); 1993; 173-176

667

Ramanuja (MN), Vibhakara (HS) and Jayaraman (KS). **Studies on the changes in peroxidase levels in cluster bean (*Cyamopsis tetragonoloba*) and cowpea (*Vigna unguiculata* L.) during development.** *Journal of Food Science and Technology (India)* 31(1); 1994; 11-14

Peroxidasee activity, protein content, av. wt. and moisture content of cluster bean and cowpea during 8 stages of development were studied. Peroxidase activity which increased upto the stage of maturity, declined largely till the stage of senescence. The soluble protein which first declined, increased and reached max. at senescent stage. The isoenzyme patterns of peroxidase varied during development, with cluster beans possessing two isoenzyme bands, cowpea five bands initially and a sixth band at maturity stage. SD

Bengalgram

668

Singh (S), Awasthi (R) and Gupta (SP). **Effect of neutral tannins on canned green Bengalgram (*Cicer arietinum*).** *Journal of*

Food Science and Technology (India) 31(1); 1994; 49-51

Effect of process operations and natural tannins on the quality of canned green *Bengalgram* indicated that the tannins from green leaf tissue of *Bengalgram* are highly suitable as blanching and covering medium. It maintained the colour of the seeds and imparted acceptability to the product. AA

Carobs

669

Albanell (E), Plaixats (J) and Cya (G). **Determination of chemical composition of carob pods by near-infrared reflectance spectroscopy.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 309-312

Results obtained demonstrate that the optimal number of wavelengths (WL) to predict chemical composition in carob pulp is the same (3 terms) for dry matter and crude protein while 6 WL terms are needed for reducing sugars. NIR reflectance spectroscopy technique can be used to evaluate the quality of carob pulp from different geographical areas quickly and accurately. This has not been reported previously. BV

Chickpeas

670

Punia (D) and Chauhan (BM). **Nutrient make up, level of antinutrients, cookability and consumer preferred characteristics of high yielding chickpea varieties.** *Bulletin of Grain Technology* 31(1); 1993; 44-51

Three chickpea var. were studied for hydration capacity, hydration index, swelling capacity (SC), swelling index and cooking time. Except SC, other parameters varied among var. There were no change in the values of proximate principles and protein digestibility (*in vitro*). Carbohydrates, phytic acid, polyphenols, saponins and trypsin inhibitors varied significantly. Lectin was present in all the var. GS

671

Singh (A) and Mehta (U). **Cookability and organoleptic properties of chickpea (*Cicer arietium*) varieties.** *Bulletin of Grain Technology* 31(1); 1993; 52-57

Sixteen var. of chickpea (*C. arietinum*) were studied for soakability, cooking period in tap water and distilled water, seed appearance, colour, flavour, texture, taste, feel in the mouth and overall acceptability. In tap water, soakability of seeds was slightly more and cooking period higher than in distilled water. The range of wt. increase was 57.5 to 72.5%. Cookability of all the Desi var. were similar but had significantly higher cooking period than that of Kabuli var. Flavour of none of the var. was highly liked. The scores for texture ranged between 5.33 to 7.1. All the var. except C-235 and H-84-70 showed moderately liked texture, acceptable taste and good overall acceptability. GS

Cowpeas

672

Giami (SY) and Okwechime (UI). **Physicochemical properties and cooking quality of four new cultivars of Nigerian cowpea (*Vigna unguiculata* L. Walp.).** *Journal of the Science of Food and Agriculture* 63(3); 1993; 281-286

Four new cowpea cvs (IT81D-699, IT82E-18, IT84S-2246-4 and TVx 3236) were evaluated for their physicochemical properties and cooking quality. The 4 cvs fell into 2 categories (rough and smooth) according to testa texture, and varied in seed dimensions and wts with IT81D-699 and IT84S-2246-4 having smaller seed vol. than IT82E-18 and TVx 3236. Leached solids, swelling capacity and seed coat percentage were within a range of 0.33-0.94 g/100 g, 77.0-123.5 g/100 g and 5.6-15.7% w/w of dry beans respectively. The total polyphenol content of the brown or cream-coloured beans were similar (1.53-1.96 mg g^{-1}) but higher than the amount (1.03 mg g^{-1}) found in the white bean. Cooking time varied between 29 and 37 min and was reduced by about 21% following a presoaking treatment in water for 12 h at room temp. (28°C). Cooking time was significantly positively correlated ($P < 0.05$) with seed wt., ($r = 0.82$) and seed vol. ($r = 0.75$). Water absorption was not related to cooking time, and was much lower for the cv with larger seeds. No significant difference in hardness was found between unsoaked beans cooked for 30 min and soaked beans cooked for 10 min, suggesting that cookability for all cvs was improved through soaking. AA

673

Singh (P) and Bhattacharya (L). **A study on cooking time and its relationship with physical characteristics of cowpea (*Vigna sinensis*).** *Bulletin of Grain Technology* 31(1); 1993; 69-70

Five cowpea var. UPC-124, UPC-125, UPC-126, UPC-287 and F-Bulk were evaluated for their cooking time, seed size, vol. density, hydration capacity, hydration index, swelling capacity and swelling index. The observed physical characters were not largely responsible for the cooking time required for cowpea. GS

674

Marconi (E), Ng (NQ) and Carnovale (E). **Protease inhibitors and lectins in cowpea.** *Food Chemistry* 47(1); 1993; 37-40

Wild *Vigna vexillata* showed significantly higher trypsin and chymotrypsin inhibitors and significantly lower lectins as compared with cultivated accessions of cowpea implying that domestication operates an indirect selection for these characters. Correlation between chymotrypsin inhibitors and trypsin inhibitors and that between trypsin inhibitors and protein content were significant. The high resistance to Bruchid and the high trypsin inhibitor content of *V. vexillata* indicate that protease inhibitors promote or a component of the plants' defence mechanism. SD

675

Onigbinde (AO) and Onobun (V). **Effect of pH on some cooking properties of cowpea (*V. unguiculata*).** *Food Chemistry* 47(2); 1993; 125-127

The cook wt. of white cv. of cowpea (*Vigna unguiculata*) which varied significantly attained max. at about 30 min and 40 min at pH 12, pH 7 respectively and min. at boiling temp at pH 2. The intensity of browning, which increased significantly after boiling with 2 peaks at pH 5-6 and pH 9-10 respectively, reached max. at pH 10-12 in raw beans. Use of alkaline pH is suggested to alleviate the problem of storage induced hardness-to-cook and dehulling to reduce the associated browning. SD

676

Giami (SY). **Effect of processing on the proximate composition and functional properties of cowpea (*Vigna unguiculata*) flour.** *Food Chemistry* 47(2); 1993; 153-158

Protein solubility, water and fat absorption, bulk density, foam capacity and stability of raw, germinated, fermented and heat-treated cowpea flours were analysed. Germination increased crude protein, Fe and total P but decreased carbohydrate, fat and total polyphenol content. pH dependent protein solubility was min. at pH 4.0. Germinated flour recorded max. protein solubility, 0.39 mg/ml and excellent fat absorption. Heat treated cowpea flour showed significantly higher water absorption than raw, germinated or fermented samples. Bulk densities of germinated and fermented flours were reduced by 70.6 and 35.3% respectively. Raw flour gave more stable foam than processed samples. NaCl upto 0.2 m improved foam capacity of raw and processed flours. Raw cowpea flour having better water and fat absorption than raw winged bean or soy flour, may find useful application in bakery products and ground meat formulations. SD

Horsegram

677

Sudha (N), Mushtari Begum (J), Vijayalakshmi (D) and Annapurna (ML). **Protein quality and utilization of horsegram in selected products.** *Beverage and Food World* 21(1); 1994; 23, 24

Sensory quality of *dhokla*, papad and cookies prepared by incorporating horsegram (50%) evaluated. The mean score of control products with respect to appearance was higher than the test products except for *dhokla* where the test and control product had a similar mean score of 4.6. Texture, flavour and overall acceptability of test products were better than the control except for cookies. Study concludes that horsegram, a less expensive pulse can be used in variety of products and germination of whole grain enhances the protein quality. SRA

Mung beans

678

Saxena (S) and Bhattacharya (L). **Proximate composition of improved varieties of mung bean.** *Bulletin of Grain Technology* 31(1); 1993; 41-43

Five improved var. of mungbean (*Vigna radiata* L.) viz., PM 1, PM 2, PM 3, K 851 and UPM 83-8 were analysed for moisture content, total ash, crude fibre, crude protein, crude fat, carbohydrate and energy content. The moisture ranged from 11.16 to 12.31%, total ash 3.46 to 4.73%, crude fibre 5.15 to 6.06%, crude protein 18.05 to 23.69%, crude fat 1.07 to 1.70%, carbohydrate 65.02 to 72.06% and energy 362 to 371 kcal. UPM 83-8 appeared to be a promising var. AA

Peas

679

Bishnoi (S) and Khetarpaul (N). **Effect of domestic processing and cooking methods on in-vitro starch digestibility of different pea cultivars (*Pisum sativum*).** *Lebensmittel-Wissenschaft und - Technologie* 47(2); 1993; 177-182

Vegetable (Bonneville and Arkel) and field peas (HFP4 and Rachna) showed significant varietal differences in starch digestibility (*in vitro*) reducing sugars, non-reducing sugars and starch. Soaking for 6, 12 and 18 h; soaking (12 h) followed by dehulling; ordinary and pressure cooking of unsoaked, soaked and soaked-dehulled seeds; and sprouting for 12, 24 and 48 h brought significant increase in starch digestibility. Cooking (gelatinising starch) and sprouting (mobilising starch) improved starch digestibility by pancreatic amylase. Pressure cooking was most effective followed by ordinary cooking, sprouting, dehulling and soaking. SD

680

Bishnoi (S) and Khetarpaul (N). **Saponin content and trypsin inhibitor of pea cultivars. Effect of domestic processing and cooking methods.** *Journal of Food Science and Technology (India)* 31(1); 1994; 73-76

Field and vegetable cvs (Bonneville and Arkel) of peas contained saponins in the range of 109-251 mg/100 g and trypsin inhibitors 922-989 TIU/g. Sprouting, soaking, soaking + dehulling, pressure cooking of unsoaked/soaked-dehulled peas significantly ($P < 0.05$) reduced the antinutrients. Pressure cooking of soaked-dehulled pea reduced trypsin inhibitors by 90-95% and germination for 48 h lowered saponin content by 67 - 84%. SD

OILSEEDS AND NUTS

Groundnuts

681

Malundo (TMM) and Resurreccion (AVA). **Optimization of liquid whitener from peanut extract.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 552-557

Proportions of peanut extract, cottonseed oil, and water in liquid whitener were optimized. 84 consumers rated the performance and sensory characteristics of a commercial control and 12 whitener blends containing varying proportions of extract, oil, and water. Solubility, whitening power, colour uniformity, and appearance acceptability of blends containing 0.533, 0.367, or 0.200 peanut extract and no oil were not significantly different from the control. The control had flavour acceptability significantly higher than all experimental blends and overalll acceptability not significantly different from a blend with 0.367 peanut extract and no oil. Responses of all dependent performance and sensory variables to the component blends studied were predicted by reduced cubic polynomials. Overall acceptability was the limiting response for the optimum product. Use of over 0.50 peanut extract in the blend resulted in unacceptable products. The max. amount of oil in an acceptable formulation was 0.01 of the component blend. This was blended with 0.20 extract. Acceptable oil levels decreased with increasing extract levels. Optinum formulations had consumer ratings of at least 7.5, 6.0 and 6.5 for solubility, whitening power, and colour uniformity respectively. AA

682

Begum (M) and Majumder (SK). **Incidence of groundnut mycroflora under different drying conditions with reference to oil quality.** *Bulletin of Grain Technology* 31(1); 1993; 58-60

Groundnut pods with 34% moisture content (MC) were subjected to (i) sundrying, (ii) shade drying and (iii) oven drying. Rapid decrease in MC was observed in (iii). There was no aflatoxin content in (i) and (iii) but (ii) recorded 11.11 p.p.b. MC below 10% could ensure quality of the groundnut oil. GS

683

Bankole (SA) and Adebajo (LO). **Effect of relative humidity during storage on the shelf life of Nigerian groundnut cake snacks.** *Die Nahrung* 37(2); 1993; 177-178

Groundnut snacks stored at 80% RH and above had mould growth within 7 days of storage whereas those stored at 72.5% RH were free of visible mould growth up to 2 wks after storage. Mouldiness was not detected in snacks stored at 62% RH and below throughout the period of storage. After 3 wks in storage, the surface of the snacks stored at 91% and 100% RH were ramified by the mycelia of the different mould species and the individual snacks were indistinguishable. The snacks stored at 62% RH and below still retained their normal colour throughout the storage period and the odours and tastes of snacks stored at these RH were as good as freshly prepared snacks. Based on the results obtained the groundnut cake snacks of low moisture content should be kept in a dry atm. at 62% RH or lower to prevent their rapid deterioration, due to mould. BV

Soybeans

684

Kitamura (K). **Breeding trials for improving the food-processing quality of soybeans.** *Trends in Food Science and Technology* 4(3); 1993; 64-67

The use of breeding techniques to alter the seed protein composition and flavour of soybeans; development of new soybean var. with improved processing characteristics; and elimination of seed lipoxygenase isoenzymes are the aspects reviewed. GS

685

Sharma (YK) and Subramanian (N). **Comparative studies on functional properties of soymeals from 'Kalitur' and 'Bragg' varieties.** *Journal of Food Science and Technology (India)* 31(1); 1994; 27-31

'Kalitur' (black) soybean var. was evaluated and compared with 'Bragg' var. for the functional properties of their meals. Water absorption capacities were 217 and 237 g/100 g of 'Kalitur' meal proteins and its heat processed meal, respectively. Fat absorption capacities were 112 and 141 g oil/100 g 'kalitur' and its heat processed meal, respectively. Foaming and emulsification capacities were min. at pH 4.5 and higher at alkaline and highly acidic pH. Foam stability increased with increase in concn. upto 0.4 M NaCl and then started decreasing. The data indicate high potential of 'kalitur' meal protein for application in food system. AA

686

Klus (K), Borger-Papendrof (G) and Barz (W). **Formation of 6,7,4'-tribydroxyisoflavone (factor 2) from soybean seed isoflavones by bacteria isolated from tempe.** *Phytochemistry* 34(4); 1993; 979-981

The tempe-producing bacteria *Brevibacterium epidermidis* and *Micrococcus leteus* transformed the soybean isoflavone glycitein to 6,7,4'-trihydrooxyisoflavone (factor 2). A third tempe-producing bacterium, *Microbacterium oborescens*, converted the soybean isoflavone daidzein to factor 2 and glycitein. The products of these transformation reactions were elucidated by spectroscopic techniques. AA

687

Kanchana (S), Neelakantan (S) and Banumathi (P). **Studies on the formulation of high protein snack foods using soybeans. II. Savouries.** *Indian Journal of Nutrition and Dietetics* 27(8); 1990; 243-249

Soybean and soydhal were soaked in tap water at room temp. for different periods of time viz. 30, 60, 120 and 180 min followed by deep frying of soybean (3, 5 and 7 min) and soydhal (2, 4 and 6 min) in refined sunflower oil at 200°C. Salt and chilli powder were added (1%). Storage studies were conducted by storing items in 4 different containers: (i) kraft paper bag (ii) wax paper bag (iii) polyethylene bag and (iv) glass bottles for a period of 4 wk at room temp. (28 - 34°C and rh 54-65%). The moisture content was determined once in 4 days throughout the storage period. Moisture content increased with the soaking period. The protein content of both soybean and soydhal savouries was around 41 g % per 100g for all the frying periods. Frying of the bean or dhal exerted a greater influence on the destruction of trypsin inhibitor activity than soaking. For soybean savoury, soaking for 120 min followed by deep frying for 7 min was optimum. For soydhal savoury, soaking for 60 min followed by 4 min of frying was found to be optimum. The snacks could be kept for a period of 28 days in air tight containers and for 12 days in flexible packages. GS

Soy flour

688

Bargale (PC) and Griffin (RC). **Studies on modified atmospheric packaging of full fat soyflour.** *Indian Journal of Nutrition and Dietetics* 28(4); 1991; 118-121

Full-fat soy flour (FFSF) treated with inert N and packed in LDPE pouches and laminated Al. foil were stored at (i) low temp./ low humidity (25°C/40% RH) and (ii) high temp./high humidity (40°C/90% RH). Results indicate treated FFSF could be stored for 60 days. BV

Soy milk

689

Nayak (RR). **Preparation of *shrikhand* using soymilk.** *Beverage and Food World* 21(1); 1994; 30, 31

This paper briefly discusses the attempt made to prepare *shrikhand* using soybean and soy milk (SM). The method of preparing SM, soy curd by lactic fermentation with *dahi*, preparing *shrikhand* from soy chakka and various parameters involved in the manufacture of soy *shrikhand* are described. SM boiled, cooled to 30°C, 3% w/w glucose was added and fermented with 7-10% w/w dahi. *Shrikhand* was prepared by adding equal amounts of sugar and chakka (w/w), colours and flavours and analysed for microbiological and sensory quality. Results showed that the optimum fermentation time of soy curd was 12 h with curd level having pH 4.06, acidity 1.30% as lactic acid. Soy curd thus obtained had beany flavour. Addition of flavour and colour masked this flavour, and made the product more tasteful. Various combination of cardamom gave excellent organoleptic quality, and the product could be stored at 15°C for more than 4 wks. SRA

Soy proteins

690

Horvatic (M) and Gruner (M). **Effect of gamma-irradiation on methionine and tryptophan content in soya protein products.** *Die Nahrung* 37(2); 1993; 147-152 (De)

Irradiation with doses of 1, 3 and 5 kGy caused significant (p = 0.05) decrease of methionine contents in soy protein products. Parallel with the decrease in methionine also the relative quality of proteins is lowered. Tryptophan content were significantly reduced (p = 0.05) at irradiation doses of 3 and 5 kGy. The relative decrease of methionine and tryptophan contents are significantly correlated (p = 0.05) with relative increase in amount of products by the irradiation induced oxidation of lipids; correlation coeff. were 0.576 and 0.715. BV

Soyflakes

691

Bargale (PC), Joshi (KC) and Jha (K). **Studies on keeping quality of soyflakes in different packaging materials under humid condition of storage.** *Bulletin of Grain Technology* 31(1); 1993; 32-37

Efforts were made to enhance the shelf-life of soyflakes (SF) under humid conditions of storage (25°C/80% RH) through use of various packaging materials viz. laminates of polyester/Al. foil/LDPE; Al foil/paper/wax coated paper: paper/Al foil/LDPE and LDPE packs with different gauges. All the laminates could store the flakes for 60 days whereas the LDPE could store it for 15 days only. Although all the laminates were found suitable, the laminate with 12 micron polyster/0.009 mm Al. foil/150 ga. LDPE may be preferred over others for short-term storage of SF under humid conditions. AA

Sunflower

692

Raymond (J), Rakariyatham (N) and Azanza (JL). **Purification and some properties of polyphenol oxidase from sunflower seeds.** *Phytochemistry* 34(4); 1993; 927-931

The polyphenoloxidase from *Helianthus annuus* was purified by a combination of SP-Sephadex G-50 chromatography, DEAE-cellulose chromatography, Sephadex G-150 gel filtration and Concanavalin-A-Sepharose chromatography. The final product gave a single band on PAGE. The enzyme purification factor was 149 with a 5% recovery and a carbohydrate content of 6.7%. The partially purified enzyme exhibited the pH optimum at pH 7.9 with gallic acid as substrate and a good stability in the pH range 4.8-7.9 and below 45°C. The enzyme showed activity towards σ-diphenols with no detectable monophenolase activity: the K_m value for gallic acid was 1.11 mm. It was characterized by response to various inhibitors. L-Cysteine, β-mercaptoethanol, sodium metabisulphite, dithiothreitol and phenyl hydrazine inhibited strongly. Purified PPO is a monomeric enzyme and has a M_r ca 42000 on SDS-PAGE. AA

TUBERS AND VEGETABLES

Carrots

693

Nyman (M), Nylander (T) and Asp (NG). **Degradation of water-soluble fibre polysaccharides in carrots after different types of processing.** *Food Chemistry* 47(2) 1993; 169-176

Frozen, blanched, boiled, microwaved and canned carrots were studied. Mol. wt. of frozen and blanched carrots was comparable. Boiled microwaved and canned showed increase in both high mol. and low mol. wt. fractions of soluble polysaccharides (especially pectic substances) isolated after digestion of protein and starch indicating solubilization of originally insoluble material as well as a degradation of the soluble high mol. wt material. But in the polysaccharide fraction isolated directly without any degradation of protein and starch, there was an increase only in the low mol. wt. fraction and only when the materials were microwaved and canned. The viscosity of polysaccharides isolated without degradation of protein and starch correlated with the extent of degradation of polysaccharides. With all the treatments the viscosity of soluble fibre isolated after degradation of protein and starch was similar. SD

Sugar beet

694

Dongowski (G). **Isolation of dietary fiber preparations from extracted sugar beet pulp.** *Die Nahrung* 37(4); 1993; 364-373 (De)

The preparation of dietary fiber from extracted sugar beet pulp by treatment with peracetic acid (PAA) was investigated by application of statistical experimental plans of a second order. The influence of reaction temp. and time and of PAA concn. on the amount of alcohol-insoluble substance, the PAA consumption, the content of pectin and protein, the degree of whiteness and the water binding capacity was determined and discussed for optimization of preparation parameters. A dietary fiber product from sugar beet pulp prepared under optimum conditions has good sensory properties and consists of 56.1% insoluble and 16.1% soluble dietary fiber, 36.7% cellulose, 9.7% hemicellulose-pentoses and 7.1%-hexoses, 16.9% pectin, 11.0% raw protein and 1.1% raw fat. Neutral saccharide residues were 36.1% glucose, 8.1% arabinose, 5.8% galactose, 1.1% rhamnose, 0.7% xylose and < 0.05% mannose. AA

Cassava

Cassava products

695

Essers (SAJA), Bosveld (M), Van der Grift (RM) and Voragen (AGJ). **Studies on the quantification of specific cyanogens in cassava products and introduction of a new chromogen.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 287-296

The enzymic assay for cyanogens in cassava as developed by Cooke (1978) and improved by O'Brien et al (1991), was compared with a standard method, involving autolysis/steam distillation/titration, and further improved with a more acceptable coloration and other minor changes. Cooke's assay, using a linamarin calibration curve, gave similar values for cyanogenic potential in fresh cassava as the standard method. For cassava samples with high non-glycosidic cyanogen levels, Cooke's assay yielded slightly lower values. Isonicotinate/1,3-dimethyl barbiturate as reagent in the Konig reaction had the following advantages compared with the so far applied pyridine/pyrazolone colour reagent. It is less toxic and does not release repulsive vapours. It is faster, cheaper and easier to handle, and has increased sensitivity and longer storability. Direct measurement of cyanogenic potential was accurate in extracts containing 35-700 μm. Recovery of linamarin supplements was 102 plus or minus 4%. Separate calibration curves of linamarin, acetone cyanohydrin and KCN were necessary for accurate calculation of cyanogenic glycosides and cyanohydrin levels. Extract storability depended slightly on storage temp., but was not changed by inclusion of ethanol in the extract medium. AA

Potatoes

696

Simal (S), Berna (A), Mulet (A) and Rossello (C). **A method for the calculation of the heat transfer coefficient in potato drying.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 365-367

A method for the detn. of the heat transfer coeff. was proposed for the first falling drying period of potato cubes. During this period, heat and mass transfer were considered as coupled phenomena. Temp. calculation inside the sample was performed using the macroscopic heat transfer balance. The heat transfer coeff. was computed by means of parameteric identification, using the Gauss-Newton method. The figure obtained for the heat transfer coeff. shows good agreement with other sources. AA

Sweet potatoes

697

Jyh-Bin Sun, Severson (RF) and Kays (SJ). **Quantitative technique for measuring volatile components of baked sweet potatoes.** *Hortscience* 28(11); 1993; 1110-1113

Volatiles formed during baking 'Jewel; and 'Centennial' sweet potatoes at 204°C were purged with He or HeO_2 mixture, collected in cold methylene chloride, and reduced in vol. Volatile components were quantified. Quantitatively, the major components were 2-furaldehyde; 2-furanmethanol; benzaldehyde; 5-methyl (2-furfural; phenylacetaldehyde; 3-hydroxy-2-methyl-4H-pyran-4-one; 2, 3-dihydro-3, 5-dihydroxy-6-methyl-4H-pyran-4-one and 5-hydroxy- methyl-2-furancarboxaldehyde. SRA

Vegetables

698

Ghafoorunissa and Pangrekar (J). **Vegetables as sources of α-linolenic acid in Indian diets.** *Food Chemistry* 47(2); 1993; 121-124

Total lipids were extracted from fresh vegetables, legumes (dry beans) and fenugreek seeds and the fatty acid compositions were determined. The dry beans and fenugreek seeds contain high amounts of both linoleic and α-linolenic acids. Rajmah and cowpea provide more α-linolenic acid as compared to Bengal gram and peas (linoleic/α-linolenic ratio less than or equal to 1.7 and 5.0 respectively). Fenugreek seeds contain -25 α-linolenic acid. On an av. the green leafy vegetables provide about 7 time more α-linolenic acid than fresh beans and other vegetables. In cereal pulse-based lacto-vegetarian diets, inclusion of plant foods rich in α-linolenic acid on a regular basis can make important contributions to the intake of n-3 fatty acids and may ensure a better nutritional status of these fatty acids. AA

Bitter gourd

699

Kalpana Platel (ShurpalekarKS) and Srinivasan (K). **Influence of bitter gourd (*Momordica charantia*) on growth and blood constituents in albino rats.** *Die Nahrung* 37(2); 1993; 156-160

Feeding of bitter gourd (*M. charantia*) at 0.02, 0.1 and 0.5% (dry wt.) levels in a semi-synthetic diet for a period of 8 wks did not have any adverse influence on the food intake, growth and organ wts. of normal adult rats. The haematological parameters of these experimental rats were also normal. Serum cholesterol levels of the rats receiving 0.5% bitter gourd were significantly lower than those of the control rats. There was no hypoglycaemic effect of bitter gourd in these normoglycaemic rats. AA

Carrots

700

Abdelrahim (KA), Ramaswamy (HS), Marcotte (M) and Toupin (C). **Mathematical characterization of residence time distribution curves of carrot cubes in a pilot scale aseptic processing system.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 498-504

Residence time distribution (RTD) of food particles and carrier fluid was evaluated in a commercial pilot scale aseptic processing system using a full factorial design of experiments employing flow rate (15 and 20 kg/min), temp. (80 and 100°C), holding tube length (1.5, 17.5 and 26.7 m) particle (carrot cubes) size (6 and 13 mm) and starch concn. (30 and 50 g/kg) of the carrier fluid as factors. RTD curves of carrot cubes were characterized in this study using a special case of the logistic model (autocatalytic or inverse exponential model). Three model parameters (an accumulation rate factor), B, a concn. limit factor, U and a half-time factor, M fully described the RTD curve: $F = C/[1 + e^{-B(0-M)}]$. The model was used to describe the influence of various process parameters and to obtain E-type RTD curves. All test factors were significant ($P < 0.05$) in influencing the parameters associated with the logistic model. Using multiple regression, the logistic parameters were related to the experimental factors ($R^2 > 0.78$). AA

FRUITS

Apples

701

Shalon (NB), Hanzon (J), Klein (JD) and Lurie (S). **A postharvest heat treatment inhibits cell wall degradation in apples during storage.** *Phytochemistry* 34(4); 1993; 955-958

Changes in pectic fractions occurring during storage of heated and non-heated apple fruit (*Malus domestica* cv Golden delicious) and the correlation with fruit softening during storage were studied. Pre storage heating (38 for 4 days) of apples lead to enhanced retention of fruit firmness during storage and post storage ripening. Softening of the fruits during storage at 0°C was accompained by an increase in H_2O-

and CDTA (trans-1,2-diaminocyclohexane-N,N,N',N'-tetracetic acid soluble pectin), a decrease in uronic acid content in Na_2CO_3-soluble pectin and no change in the uronic acid present in the insoluble fraction of the cell wall. These changes did not occur in heated fruit during storage. Decrease in arabinose during fruit heating was from pectic fractions while galactose decreased in both pectic fractions and the insoluble residue. GS

Blueberries

702

Kader (F), Rovel (B) and Metche (M). **Role of invertase in sugar content in highbush blueberries (*Vaccinium corymbosum* L.).** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 593-595

Six batches of ripe blueberries (*V. corymbosum* L.) were analysed for sugar content. Glucose and fructose were found to be the predominant sugars, and were present in approx. equal proportion (glucose:fructose ratio of about 1). Distinct differences were observed between the sucrose concn. of all batches; the proportion of sucrose present ranged between 1.6 and 14.6 g/100 g of total sugar. No sucrose synthetase and sucrose phosphate synthetase activity was detected in any of the batches, but each batch exhibited an invertase activity. This appeared to be inversely proportional to sucrose concn. Variations in sucrose concn. were attributed to the action of the enzyme, and invertase activity was closely correlated with sucrose content. The optimum temp. for this enzyme was 60°C. Invertase can modify the sugar profile and affect the flavour of end products. Temp. control is suggested as a method to inactivate invertase, to prevent all modifications. AA

Guavas

703

Gulati (T), Sadana (B) and Nagi (M). **Development and acceptability of guava products.** *Beverage and Food World* 21(1); 1994; 28-29

Products such as *murabba* (GM), milk shake (GMS), chutney (GC), pickle (GP), raita (GR) made from guava was evaluated for organoleptic quality. Evaluation showed that GM obtained max. scores for appearance, colour, texture and overall acceptability followed by GMS and GC respectively. Mean scores for overall acceptability varied from 6.18 plus or minus 0.58 (GP and GR) to 6.66 plus or minus 0.62 (GM). GM contained max. ascorbic acid of 160 mg/100 g followed by GP 118 mg/100 g on fresh wt. basis. GMS and GR had the lowest values of vitamin C. SRA

Lemon

704

Teotia (MS), Saxena (AK), Berry (SK) and Sehgal (RC). **Studies on steeping preservation and utilization of galgal.** *Beverage and Food World* 21(1); 1994; 44-45

Galgal fruits were preserved (steeping preservation technique) using steeping sol. containing 0.07% potassium metabisulphite, 2.5% common salt and 0.2% acetic acid. The fruits kept well in the sol. for 8 months. Preserved fruits were made into excellent quality pickles and sliced fruits were candied in sugar syrup which had acceptable sensory appeal with chewy texture and sweet and sour taste. SRA

Lemons

705

Khurdiya (DS). **Home-scale processing of lime syrup and pickle.** *Indian Horticulture* 38(4); 1994; 18-19

Lime fruits are washed, cut into halves and squeezed to obtain juice. Sugar (65%), potassium metabisulphite (700 p.p.m.) as preservative are added, heated to boiling temp., filtered, cooled and stored in cool and dry place. After 15 days this syrup could be diluted with 5 parts of water for a ready to serve drink. Lime peel, after the seeds are separated, cut into quarter, mixed with common salt (20%) and kept in glass jars for a wk in sunlight. Alternatively this is pressure cooked, mixed with roasted and powdered spices for pickle preparation. SRA

Mandarins

706

Lotha (RE), Khurdiya (DS) and Maheshwari (ML). **Effect of storage on the quality of Kinnow mandarin fruit for processing.** *Indian Food Packer* 48(2); 1994; 25-38

Kinnow mandarin was stored at ambient (9-24°C, RH 65-90%), refrigerated temp. (3.3°C, RH 70-80%) and evaluated for its processing quality in terms of physical and chemical characteristics. The economic shelf-life of the fruits based on 10% physiological loss in wt. and spoilage was 22 and 56 days at ambient and refrigerated temp. respectively. The juice yield was in the range of 46.11 - 49.07%. The total soluble solids (TSS), acidity, pectin of pomace and the pectin and oil content of the peel increased at both temp. during storage. TSS, pH, ascorbic acid, pectin, cloud and density of juice from refrigerated stored fruits increased during storage, while acidity, ascorbic acid and viscosity decreased in fruits stored at ambient temp. The sugar contents were not much affected by storage temp. The total carotenoids and Hunter colour decreased at ambient temp. while it increased at refrigerated temp. AA

Mangoes

707

Kaushik (V) and Nath (N). **Standardization of a recipe for a beverage-base from unripe Dushehari mangoes.** *Beverage and Food World* 21(1); 1994; 22, 24

Dushehari mangoes were pulped by cooking whole fruit under steam pressure, peeled, destoned and blended. Beverage containing 16.7% pulp, 1.5% NaCl, 0.2% citric acid, 5.0% sugar and 1.0% spice mix gave the most acceptable product. Beverage base was also prepared using 60.1% pulp, 5.5% NaCl, 0.7% citric acid, 17.6% sugar and 3.7% spice mix. Sensory ratings were the same for beverage prepared either from this base or from the fruit pulp directly. Beverage-base remained acceptable during 120 days storage under ambient conditions. SRA

708

Doreyappa Gowda (IN) and Ramanjaneya (KH). **Studies on physico-chemical characteristics of some commercial cultivars of mango.** *Indian Food Packer* 48(2); 1994; 45-49

Physico-chemical characteristics of 11 var. of mango (Alphonso, Banganapalli, Dashehari, Janardhan Pasand, Kesar, Langra, Mulgoa, Padiri, Panakalu, Suvarnarekha and Totapuri) were evaluated. Peel and stone contents were lowest (13.0%) in Suvarnarekha; fibre content was min. (< 0.5%) in Dashehari, and Janardhan Pasand; TSS of about 19°Brix in Mulgoa, Dashehari, Langra and Alphonso; lowest acidity (0.15%) in Dashehari; max. carotenoids (11536 µg/100 g) in Alphonso; and very high vitamin C content (136.50 mg) in Langra. The pulp of Totapuri, Langra, Mulgoa, Dashehari and Alphonso was very viscous (> 7000 cps) due to higher TSS. GS

709

Khan (AA) and Robinson (DS). **The thermostability of purified mango isoperoxidases.** *Food Chemistry* 47(1); 1993; 53-59

Samll amounts of purified mango (var. *Chaunsa*) anionic and cationic isoperoxidases were obtained by ion-exchange chromatography. Peroxidase activity present in crude extract of mango pulp is shown to be less stable to heat than the enzyme activity of highly purified individual mango isoperoxidases for which heat-inactivation is still non-linear. This may be due to microhetrogeneity in covalently bound oligosaccharide residues at the molecular level. Isoperoxidase activity did not regenerate after heat treatment of crude mango extracts or purified isoenzymes. SD

Melons

710

Moshonas (MG), Shaw (PE), Baldwin (EA) and Yuen (W). **Volatile and non-volatile components in hami melon (*Cucumis melo* L.).** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 577-589

Hami melon (*Cucumis melo* L. var. Winchosen) flesh was extracted and the extract analysed by

GC-MS, resulting in idenification of 42 volatile components. Twenty-four components were newly reported in *Cucumis melo*, including a series of 4 diacetate esters. Non-volatile components quantified in Hami melon flesh include fructose, glucose, sucrose and ascorbic acid. AA

711

Adebajo (LO). **The microbial spoilage of 'soft' melon ball snack under tropical conditions.** *Die Nahrung* 37(4); 1993; 328-335

Nineteen pathogenic and spoilage microorganisms, were isolated from 'soft' melon ball snack samples in the humid Western Nigeria. Physical biodeterioration was recorded from the 6th day of storage with the early occurring rope (slime) of *Bacillus* sp. All the 14 isolated fungi grew though, to varying extents on the snack agar and in the melon seeds infusion medium in which they also induced significant changes in the oil (decrease) and free fatty acids (increase) contents after 10 days of incubation at 30°C. The results indicated *Rhizopus arrhizus*, *R. nigricans*, *Aspergillus flavus*, *A. ochraceus*, *A. tamarii*, *A. niger*, *Mucor fragilis* and *Penicillium citrinum* as the major fungal deteriogens. Isolation of *Escherichia coli* suggested the need for a more hygienic handling of the snack. Addition of breadfruit nuts mash (20%) as adjunct to melon seeds mash to enhance mastication of the snacks with lower moisture content recorded mean acceptability rating of 178 and keeping quality of 10 days while 200 and 5 days were obtained respectively for the control. BV

Papayas

712

Fayyaz (A), Asbi (BA), Ghazali (HM), Cheman (YB) and Jinap (S). **Pectinesterase extraction from papaya.** *Food Chemistry* 47(2); 1993; 183-185

Inactivation time, pH and NaCl influenced the extraction process of pectinesterase (EC.3.1.1.11) from papaya fruit (*Carica papaya* L.) 2 m NaCl sol., pH 8 and 5 h incubation time resulted in max. activity of 6.98 units/min. ml. SD

CONFECTIONERY, STARCH AND SUGAR

713

Kasapis (S). **A study on the unusual spectroscopic behaviour of the *Rhizobium* capsular polysaccharide system.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 572-576

When changes in molecular organization of the capsular polysaccharide of *Rhizobium trifolii* (strain TA-1) are monitored by the standard technique of optical rotation (OR), a particularly strange phenomenon is observed. The OR change, during heating (to melt the gel network), continues initially in the same direction as the change observed on cooling (negative contribution), and is then followed by the expected reversal of sign (positive contribution), giving rise to an anomalous dip in the OR-temp. profile. This unusual feature is absent in the temp. dependence of optical rotation on heating at concn. below about 5.5 mg/mL and reaches its max. depth at the highest concn. used (16 mg/mL). As a result, the change in specific rotation decreases by about a factor of 4 between 0.1 and 16 mg/mL but the accompanying enthalpy change shows no evidence of a reduction in the extent of conformational ordering at higher concn. However, rapid decrease of temp. for the *Rhizobium* samples produces a large positive shift in OR, suggesting an antogonism between network formation (negative contribution), which is favoured by slow cooling rates, and chiral structures of competing optical activity (positive contribution) which are more effective on rapid cooling. The chiral aggregates, entrapped within the network, are also responsible for positive differential scattering as detected by circular dichroism. AA

Confectionery

Sweets

714

Yella Reddy (S) and Prabhakar (JV). **Effect of ingredients and processing conditions on fat absorption and texture of *Mysore pak*.**

Journal of Food Science and Technology (India) 31(1); 1994; 44-48

The effects of process parameters and functional properties of the ingredients on fat absorption and texture of *Mysorepak* were studied. The results revealed that the processing condition, such as syrup strength, mixing time and temp. of the fat have considerable influence on fat absorption and texture of *Mysorepak*. The type of fat suitable to impart the desirable texture was found to be a mixture of hydrogenated fat and liquid oil. The fat absorption by cereal flours, such as *maida*, rice and corn starch, was found to be less than that of *besan* (Bengalgram flour). Rice flour and corn starch were not well suited for the preparation of *Mysorepak*. Refined wheat flour could be used in the preparation, but it imparted harder texture. The hardness of the product was found to be inversely proportional to the qantity of fat in the product. *Mysorepak*, having a wide range of textural properties (hardness), could be prepared by altering process parameters and relative proportions of the ingredients. The product formulation and process parameters to obtain *Mysorepak* having uniform texture and fat content, have been specified. AA

Starch

715

Gibson (TS), Kaldor (CJ) and McCleary (BV). **Collaborative evaluation of an enzymatic starch damage assay kit and comparison with other methods.** *Cereal Chemistry* 70(1); 1993; 47-51

A commercially available enzymatic assay kit for the measurement of starch damage in wheat flour was compared with current standard methods, and the kit's precision and repeatability were determined in a collaborative study. Starch damage values determined on a range of flours with the assay kit correlated well ($r > 0.96$) with those determined by existing standard enzymatic methods. The precision of the kit was evaluated in a comprehensive interlaboratory study. The kit procedure was found to be highly repeatable (relative standard deviation, 2.94 - 6.80%) and reproducible (relative standard deviation, 5.00 - 10.30%). AA

Sugars

716

Toufeili (I) and Dziedzic (S). **Synthesis and taste properties of maltose and maltitol analogues.** *Food Chemistry* 47(1); 1993; 17-22

The hypothesis that intramolecular hydrogen bonding is responsible for the sweetness of maltitol is tested by the synthesis of maltitol analogues which differ in configuration at C''_3 and C'_4 and sensory evaluation of the products. 3-*Allomaltitol* and *galactomaltitol* were synthesised by treating suitably protected methanesulphonylated derivatives of benzyl β-maltoside with sodium benzoate followed by removal of the blocking groups and subsequent reduction with sodium borohydride. Sensory evaluation of maltose, maltitol and their analogues revealed that the non-reducing end is involved in the generation of the sweet response and that intramolecular hydrogen bonding governs the accession of this class of polyol sweeteners to the receptor site on the tongue. AA

BAKERY PRODUCTS

717

Neyreneuf (O) and Delpuech (B). **Freezing experiments on yeasted dough slabs. Effects of cryogenic temperature on the baking performance.** *Cereal Chemistry* 70(1); 1993; 109-111

Yeasted dough slabs were frozen under very controlled and different cooling velocities (conventional mechanical refrigeration at -40°C, used as a reference, and cryogenics from -40 to -120°C). Cooling velocity at the core of the dough slabs was about 7 times higher with cryogenics at -120°C than with blast-freezer treatment at -40°C. Throughout 3 months of storage, the baking performance of dough slabs was not affected by the -40 and -60°C cryogenic treatments, whereas decreasing the freezing temp. successively to -80, -100 and -120°C involved a gradual drop in bread vol. (about 15% per operation). Freezing at -60°C yielded the best results in terms of quality (bread vol.) and productivity (freezing time). Cryogenics in closely controlled conditions should permit a gain in productivity without affecting baking performance. AA

718

Vijaya Rao (D), Radhakrishna (K), Jayathilakan (K), Vasundhara (TS), Bhagirathi (B), Gopal Rao (KR), Srihari (KA), Siddalingaswamy (A). **Manufacture of freeze dried breakfast and dessert foods.** *Journal of Food Science and Technology (India)* 31(1); 1994; 40-43

Quickly rehydratable and nutritious breakfast and dessert foods have been developed using freeze-drying. The freeze-dried wheat porridge (*dalia*), rice pudding (*kheer*) and vanilla custard contained 11.2-12.2% protein and provided 428, 447 and 403 Kcal/100 g, respectively. These are also rich in Ca^{+2} and P^{-5} (306 to 325 mg/100 g and 316.8 to 385 mg/100 g, respectively). These were stable for 6-9 months at 37°C, when packed in paperfoil-polythene-laminate flexible pouches. They exhibited a rehydration ratio of 1:3. *Dalia* and *kheer* could be rehydrated satisfactorily at 45°C, 70°C and in boiling water in 20, 10 and 5 min, respectively. Custard could be instantly rehydrated at 5°C and 45°C or at higher temp., if required. AA

Bread

719

Fadel (HHM) and Hegazy (NA). **Improvement and stabilization of white bread flavour.** *Die Nahrung* 37(4); 1993; 386-394

The results showed that the model system mixture (D,L-lysine - HCl, L-proline and D-glucose) improved the crust colour and flavour of fresh bread and kept the freshness, retarded the staling and improved the quality of the bread samples stored for 3 days. Analysis of the crust aroma of the bread samples showed that 2-acetyl pyrazine, 2-acetyl pyridine and 2-methyl-3-ethyl pyrazine, which may be responsible for bread crust aroma, were determined at high concn. in the bread sample containing 0.24% model system mixture. The concn. of pyrazine derivatives increased during storage whereas the carbonyl, pyrrol and furan derivatives decreased. BV

720

Srivastava (AK), Patel (VR) and Haridas Rao (P). **Effect of common salt substitution on the dough characteristics and bread quality.** *Journal of Food Science and Technology (India)* 31(10; 1994; 15-18

Effect of substituting common salt (NaCl) with *sendha* (rock salt) or low sodium containing salt mixtures on the quality of wheat flour dough and bread was studied. In general, the common salt substitutes reduced water absorption capacity, but increased dough development time, stability, extensibility, resistance to extension and stiffness of the dough. The extent of changes with different common salt substitutes was almost similar and comparable to the dough made with common salt. Incorporation of common salt substitutes improved the loaf vol., crust colour, and crumb characteristics of the bread to the same extent as the common salt. However, only *sendha* yielded bread which had comparable taste and overall quality to that made with common salt. AA

Cakes

721

Lee (CC), Love (JA) and Jhonson (LA). **Sensory and physical properties of cakes with bovine plasma products substituted for egg.** *Cereal Chemistry* 70(1); 1993; 18-21

Dried egg whites were replaced by dried bovine plasma (BP) in high-ratio, white layer cakes at 5 different levels (0, 25, 50, 75 and 100%). Egg whites could be replaced by dried BP without reducing cake vol. Cake symmetry was altered by substituting BP for 75 or 100% of the egg. Substitution altered the colours of both BP and crumb. Cakes with BP replacing 25% of the egg had decreased L and 0 values compared with those of the control cakes. Cakes with plasma replacing egg were softer, more moist and gummy, and slightly sweeter than the controls. A blend of hydrolyzed plasma and beef stock could replace 50% of the egg in devil's food cake without affecting symmetry or shrinkage and with only a slight decrease in vol. Consumer panels indicated that cakes made with BP products were as well liked as the control cakes. BV

Macaroni

722
Ayranci (G) and Kaya (S). **Kinetic analysis of the loss of some B-vitamins during the cooking of macaroni.** *Die Nahrung* 37(2); 1993; 153-155

The kinetics of the losses of thiamin, niacinamide, and riboflavin were investigated during the cooking of macaroni at 50, 75, 80, 85 and 90°C. Simultaneous analysis of the vitamins was achieved by HPLC using a μ-Bondapak column. The activation energies for the losses of thiamin, niacinamide, and riboflavin were determined as 25 kJ/mol, 22 kJ/mol and 11 kJ/mol, respectively. It was concluded that the leaching of these vitamins into cooking water was the main pathway for their loss during macaroni preparation. AA

Melons

723
Ubani (ON), Opadokun (JS), Williams (JO), Akimnusi (A), Akano (DA), Ikeorah (JN). **Storage properties of melon seeds (*Cacumeriopsis edulis*).** *Food Chemistry* 47(1); 1993; 7-10

Unshelled melon seeds (exfiditi Nigeria) fumigated and stored at ambient condition for 10 months in metal drum, plastic bucket, clay pot, polyethylene lined jute bag and ordinary jute bag were evaluated at 3 monthly intervals. Oil content of seeds in all containers increased by 0.37 - 3.03%, protein content by 5.8 - 7.48%, internal mouldiness by 12.4 - 19.4%, external mouldiness by 39-59% and free fatty acid content by 4.23 - 5.57%. No container effect on chemical composition of seeds was apparent. Insect damage was 14% in jute bags after 9 months of storage. Initial germinability of 70% significantly reduced at the end of 10 months, being lowest 8% in clay pot and jute bag. SD

Pasta

724
Lagoudaki (M), Demertzis (PG) and Kontominas (MG). **Moisture adsorption behaviour of pasta products.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 512-516

The moisture sorption isotherms of conventional (from 100% durum wheat semolina) and diet (high protein) spaghetti were constructed at 22, 30, 37 and 45°C, using a computerized inverse gas chromatographic method (CIGC). Conventional spaghetti exhibited a higher sorption capacity than diet spaghetti. This is attributed to the higher carbohydrate content of conventional spaghetti as compared to diet spaghetti. Good agreement was observed between moisture sorption isotherms obtained from the CIGC method and the gravimetric static method. BET (Brunauer, Emmett and Teller), GAB (Guggenheim, Anderson and De Boer) and 'Local' isotherm models were tested to fit the experimental sorption data. Goodness to fit, standard deviation and the applicable range of a_w indicated that GAB and 'Local' isotherm models could explain the data well over a wide a_w range upto 0.80. AA

725
D'Egidio (MG), Mariani (BM), Nardi (S) and Novaro (P). **Viscoelastograph measures and total organic matter test: Suitability in evaluating textural characteristics of cooked pasta.** *Cereal Chemistry* 70(1); 1993; 67-72

Two sets of Italian durum wheats were used to make spaghetti: 54 samples dried at low temp. (50°C) and 64 samples dried at high temp. (90°C). Cooking quality was evaluated using sensory judgement (SJ), total organic matter (TOM), and viscoelastograph parameters. SJ was expressed by its components (stickiness, bulkiness, and firmness) and by an overall score. Factor analysis was applied as a clustering tool to assess similar behaviour of variables. Four factors were useful in describing the relationships among variables for each temp. considered. At 50°C the first factor was related to viscoelastograph parameters, the second grouped SJ, stickiness, bulkiness, and TOM, whereas firmness was linked to a different factor. At 90°C firmness was associated with stickiness, bulkiness, and

SJ on the second factor, whereas TOM shifted to another factor. Multiple regressions were calculated to evaluate the relative worths of stickiness, bulkiness, and firmness on SJ and TOM as well as their relationships with viscoelastograph measures when different drying temp. were applied. At low temp., stickiness was the most important SJ component and TOM was a suitable method in estimating SJ. At high temp., firmness played a more important role and viscoelastograph consistency was used to complement the TOM test. AA

Spaghetti

726

Malcolmson (LJ), Matsuo (RR) and Balshaw (R). **Effects of drying temperature and farina blending on spaghetti quality using response surface methodology.** *Cereal Chemistry* 70(1); 1993; 1-7

Five peak drying temp. (40, 60, 70, 80 and 90°C) and 5 blends of farina and durum (0:100, 25:75, 50:50, 75:25 and 100:0) were studied. Good-fit models were developed for compression and relaxation time of optimally cooked spaghetti, for firmness and compression of overcooked spaghetti, and for brightness. Models developed for firmness of optimally cooked spaghetti, relaxation time of overcooked spaghetti, purity and dominant wavelength did not meet all of the criteria of good fit but nevertheless provided useful information for an initial screening study. Models for strand stickiness and cooking loss had low preditive ability. The superimposition of the individual contour plots permitted the identification of the region where all predicted characteristics met or exceeded commercial durum spaghetti samples. The most limiting factors were the firmness of optimally cooked spaghetti, relaxation time of overcooked spaghetti, and dominant wavelength. To satisfy these constraints, durum levels > 60% and peak drying temp. above 60°C were required. BV

Tortillas

727

Torres (PI), Ramirez-Wong (B), Serna-Saldivar (SO) and Rooney (LW). **Effect of sorghum flour addition on the characteristics of wheat flour tortillas.** *Cereal Chemistry* 70(1); 1993; 8-13

Wheat flour tortillas (WFT) were produced from composite flours containing up to 30% decorticated sorghum flour (SF). The L, a and b colour values were not affected by substituting decorticated sorghum for wheat flour. Tortillas containing up to 20% fine flour had sensory properties similar to those of the control tortillas. Coarser SF absorbed less water and produced firmer and less flexible tortillas than did finer flours. The flexibility of fresh tortillas was similar; however, during storage, sorghum tortillas became less rollable, and became so faster, than did WFT. The addition of carboxymethylcellulose to tortillas containing 20% SF significantly decreased staling. Tortillas stored at 25°C staled more quickly than did frozen (-10°C) or refrigerated (5°C) tortillas. Decorticated SF can replace up to 20% wheat flour in hot-press WFT. BV

MILK AND DAIRY PRODUCTS

728

Picon (A), Gaya (P) and Nunez (M). **Quantitative determination of chymosin activity by thrombelastography.** *Food Chemistry* 47(2); 1993; 209-212

The coeff. of detn. between coagulation time and inverse of chymosin concn. in sol. ranged between 0.989 - 0.997 with 0.88% mean coeff. of variation while that between coagulation time and inverse of chymosin present whey ranged between 0.995-0.998 with 0.98% mean coeff. of variation proving the accuracy and objectivity of thrombelastography procedure. SD

Milk

729

Singh (H), Fox (PF) and Cuddigan (M). **Emulsifying properties of protein fractions prepared from heated milk.** *Food Chemistry* 47(1); 1993; 1-6

Heated milk was centrifuged into k-casein/whey protein-rich and k-casein depleted fractions whose emulsifying properties were compared with those of sodium caseinate (SC), whey protein isolate (WPI) and casein micelles. Fat surface areas of both the fractions and casein micelles were similar and considerably lower than that of SC and WPI. Protein load decreased with increased fat surface area and followed the order: casein micelles > k-casein depleted micelles = whey protein/k-casein rich fraction > SC > WPI. Emulsions stabilized by either fraction and by casein micelles were more stable at low fat surface areas. Size of the protein aggregate appears to be more important than their composition in determining emulsifying properties. SD

730

Pande (D) and Mathur (MP). **Age gelation in ultra heat treated milk. Some evidence for a plastein induced mechanism.** *Journal of Food Science and Technology (India)* 31(1); 1994; 77-79

Isolation of protease from whey and its role in age-gelation indicated the plastein induced type of reaction in micellar system. In contrast, casein fractions were completely hydrolysed in nonmicellar system. AA

Milk products

731

Ayranci (E) and Balci (O). **Determination of chloride and nitrate in butter, margarine, cheese and meat products using ion selective electrodes.** *Die Nahrung* 37(4); 1993; 395-398

Chloride analysis was quite easy and salt contents of all butter and margarine samples were found to be < 2 g NaCl/kg while those of cheese and meat products were above 10 g/kg. Nitrate analysis was not as easy as chloride analysis due to interferences of chloride and organic ions. These interferences were tried to be eliminated using either $Al_2(SO_4)_3$ and Ag_2SO_4 sol. or Al and silver resins. Results showed that the elimination of interferences is most effective with the use of resins in amounts of 3 g under the present experimental conditions. Nitrate contents of meat products analysed were found to be < 20 p.p.m. AA

Butter

732

Shive Kumar, Reddy (KV), Sarma (KS), Ranganadham (M) and Padmanabha Reddy (V). **Physico-chemical properties and storage stability of butter incorporated with safflower oil to enhance its polyunsaturated fatty acids.** *Indian Journal of Dairy Science* 46(5); 1993; 211-216

The composition of fresh and stored butter (control) and its blends with safflower oil (SO) (10, 20 and 30%) showed that the fat content of butter and the oil-butter blends were in agreement with PFA standards for table butter. No significant change was observed in the fat content, moisture, curd and salt content throughout the storage period of 40 days. Significant increase in iodine value, spreadability and decrease in hardness of butter was observed in butter samples blended with SO. Sensory evaluation did not show any perceptible difference between control and experimental butters, fresh or stored. Butter blend similar in flavour, body and texture and appearance could be prepared by incorporating SO upto 30%. SRA

733

Desai (NB), Thakar (PN) and Miyani (RV). **Rheological behaviour of commercial table butter in back extrusion test.** *Indian Journal of Dairy Science* 46(4); 1993; 185-186

The results revealed that the product made with continuous churn had relatively higher values for extrusion point and extrusion energy in comparison to the product made by batch method using either top or drum churn, however the differences among the various churns were non-significant. SRA

734

Shivekumar (KV), Reddy (KS), Sarma (KS), Ranganadham (M) and Padmanabha Reddy (V). **Studies on incorporation of safflower oil in butter to enhance its pufa content. Part II.**

Fatty acid profile. *Indian Journal of Dairy Science* 47(8); 1993; 375-376

This paper relates to the fatty acid profile of the oil-butter blends as influenced by the level of oil incorporation. GC analysis of butter blended with 10, 20 and 30% safflower oil revealed that there was a significant increase in the unsaturated fatty acid (USFA) content of butter. Among USFAs the G 18:2 fatty acid increased from 2.13% in control butter to 23.5% in oil butter blend. SRA

Chakka

735

Patel (RS), Kanawjia (SK) and Singh (S). **Effect of various storage temperatures on sensory and chemical characteristics of *chakka*.** *Indian Journal of Dairy Science* 46(4); 1993; 166-170

The keeping quality of *chakka* stored at 5, 10 and 30°C was investigated. The initial flavour score of *chakka* was 51.30. This value decreased with the increased storage period due to deterioration of flavour. The deterioration was faster at 30°C and slower at 5°C. The flavour of *chakka* was acceptable upto 16, 10 and 4 days, stored at 5, 10 and 30°C respectively. The spoiled samples were acidic, sour, yeasty and mouldy. The body texture score was initially 26.10, which decreased with increase in storage period. Max. reduction of score was observed in samples stored at 30°C, and min. reduction was found at 5°C. The colour of *chakka* turned to dull, yellow and the surface became hard and coarse. SRA

Cheese

736

Kanawjia (SK), Nageswara Rao (K), Singh (S) and Latha Sabikhi. **Role of Lactobacilli in cheese - a review.** *Indian Journal of Dairy Science* 46(5); 1993; 187-197

The description of the lactobacilli, their occurrence in milk and cheese, proteolytic and lipolytic systems of lactobacilli, the role of lactobacilli and their enzymes in cheese ripening, the defects or spoilage caused by lactobacilli, and the role of lactobacilli in the accelerated cheese ripening are discussed in this review. 81 references. SRA

737

Joshi (NS), Thakar (PN) and Jana (AH). **Utilization of butter milk in cheese making - a review.** *Indian Food Packer* 48(2); 1994; 59-65

The utilization of butter milk (BM) as a cheaper source of milk solids (MS) non-fat (SNF) in cheese manufacture and the effect of MS on the processing conditions and cheese quality are studied. Effective utilization of MS from BM minimizing waste disposal problem at the creamery, cost saving, increased yield, improved flavour, consistency and biological value and probable hypocholesterolemic effects are the advantages of BM utilization in cheese manufacture. Care should be taken to avoid addition of higher levels of BM in cheese production because it might cause off-flavours and reduce the keeping quality of cheese. GS

Cheddar cheese

738

Joshi (NS) and Thakar (PN). **Utilization of butter milk in manufacture of buffalo milk Cheddar cheese.** *Indian Journal of Dairy Science* 46(8); 1993; 387-392

Casein requirement for standardization of buffalo milk to casein/fat ratio 0.7 was fulfilled by skim-milk (control) and the same was substituted in 25, 50, 75 and 100%, by casein available from butter milk as experimental treatments. Cheddar cheese made from these milks revealed that with increase in proportion of butter-milk in cheese milk, the acidity of milk at rennetting increased. Fat, protein and pH of resultant cheese was reduced. The flavour, texture and body of cheese made by utilizing 25% casein from butter milk to substitute skim-milk casein remained the same as control. During ripening the texture and flavour increased. Products with 75, 100% levels of substitution were unacceptable at 4.5 months of ripening. SRA

Cottage cheese

739

Reykdal (O) and Lee (K). **Validation of chemical measures of calcium with bioassay of calcium fortified cottage cheese.** *Food Chemistry* 47(2); 1993; 195-200

Cheese was fortified at 4 levels of Ca with or without added guar to increase acceptability. Dialyzed and ionic dialyzed Ca test and soluble and ionic soluble Ca test were adopted for digested and non-digested samples. Ca added cheese sample significantly increased % Ca availability from rat diets containing the same cheese with and without guar correlated well with bioassay results. Ionic dialyzed, ionic soluble and soluble Ca correlated with bioassay measures. Ionic dialyzed Ca in non-digested diets was the best chemical test for bioavailability. Digestion did not improve accuracy. SD

Swiss Gruyere cheese

740

Bosset (JO), Collomb (M) and Sieber (R). **The aroma composition of Swiss Gruyere cheese. IV. The acidic volatile components and their changes in content during ripening.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 581-592

Part IV first reports a list of acidic volatile components isolated and identified by GC-MSD in a pool of 5 mature, first class Swiss Gruyere cheeses. The analysis of the outer zone (including the smear-coated rind), the middle and central zones revealed concn. gradients for some of the volatile components. The compounds found were principally fatty acids such as ethanoic, butanoic, propanoic, hexanoic, 2- methylbutanoic, 2- methyl propanoic, 3- methylbutanoic, pentanoic, octanoic and decanoic acids ranked by decreasing concn., and hydroxybenzene (phenol). Changes in the content of these acidic volatile substances were then studied in 2 zones of 8 first class Swiss Gruyere cheese over a 12-month ripening period. Quantitative detn. of main constituents were performed separately by GC-TCD for the 8 loaves. Semi-quantitative analyses of minor compounds were carried out by GC-MS or GC-FID only in a pooled sample. The content of 2-methylpropanoic, 2-methylbutanoic, 3-methylbutanoic, 4-methylpropanoic, hexanoic (particularly in the inner zone), octanoic, and decanoic acids as well as hydroxybenzene increased in an approx. exponential way during the ripening period. On the other hand, concn. of total volatile fatty acids, ethanoic, propanoic, butanoic, pentanoic and hexanoic (particularly in the outer zone) showed a more linear increase. Some possible metabolic pathways for the formation of these cheese flavour components are reviewed. AA

Ghee

741

Rajesh Kumar and Lal (D). **Stability of tertiary butyl hydroquinone (TBHQ) in *ghee* during storage.** *Indian Journal of Dairy Science* 46(4); 1993; 171-173

The effect of addition of TBHQ at concn. of 5, 10 and 20 mg/100 g fat to butter on its stability during conversion into *ghee* and also during storage of *ghee* was studied. Stability of TBHQ during clarification of butter into *ghee* at 120°C was relatively higher at higher concn. of added antioxidant, accounting a loss of 6% at 20 mg/100 g level fat compared to 10.8% at 5 mg/100 g level. TBHQ imparted excellent oxidative stability to *ghee* during storage at room temp. SRA

742

Galhotra (KK) and Wadhwa (BK). **Chemistry of ghee-residue, its significance and utilisation - a review.** *Indian Journal of Dairy Science* 46(4); 1993; 142-146

This review covers the following aspects: yield of ghee; particle size and density; recovery of ghee from ghee residue; composition, lipid fraction of ghee residue (physico-chemical constants, polyunsaturated fatty acids, phospholipids); proteins in ghee residue; milk sugars in ghee-residue; antioxidant properties of ghee-residue (contribution of lipid and non-lipid constituents); nutritive value and utilisation of ghee-residue (preparation of sweets, source of normal antioxidants and flavour concentrates). 31 references. SRA

Kachcha churpi

743

Pal (PK), Hossain (SKA), Sarkar (PK) and Patil (GR). **Compositional and sensory characteristics of *Kachcha churpi*.** *Journal of Food Science and Technology (India)* 31(1); 1994; 71-72

Kachcha churpi (KC), a traditional milk product, is prepared by coagulating skimmed or partially defatted cow or yak milk. KC prepared from skim milk contained more protein (31.7%) than the products from buttermilk (18.5%) and defatted milk (28.2%). On sensory quality, it was found to be superior to other products, with respect to flavour, body, texture, colour, appearance and overall acceptability. AA

Paneer

744

Johri (SS), Tyagi (SM), Chauhan (GS) and Verma (NS). **Effect of coagulants and fat levels on the quality of *paneer* prepared from cow milk.** *Beverage and Food World* 21(1); 1994; 32, 34, 35

The effect of different levels of fat (0.1 - 4%) in cow milk on *paneer* made by coagulants (1.0% citric acid (CA), 5% $CaCl_2$ calcium lactate (CaL) and calcium acetate (CaA)) was investigated. Max. milk solids could be recovered from *paneer* by coagulating milk at 80°C. The recovery of total milk solids from *paneer* was highest (65.33%) in case of CaA followed by CaL (68.79%), $CaCl_2$ (62.35%) and CA (59.87%). The yield and fat content of *paneer* increased by increasing fat level in milk whereas moisture, protein, ash and carbohydrate content, hardness, cohesiveness, springiness, gumminess an chewiness decreased. Sensory scores increased significantly by increasing fat level in milk. CaA was found to be the best coagulant for preparing *paneer* of acceptable quality from low fat milk. SRA

Yoghurts

745

Jawalekar (SD), Ingle (UM), Waghmare (PS) and Zanjad (PN). **Influence of hydrocolloids on rheological and sensory properties of cow and buffalo milk yoghurt.** *Indian Journal of Dairy Science* 46(5); 1993; 217-219

The effect of various hydrocolloids on the sensory and rheological characteristics of yoghurt prepared from standardized cow milk (4% fat, 8.5% SNF) and buffalo milk (6% fat, 9% SNF), gelatin (0.3%), sodium alginate (1.5%) and starch (1.5%) were studied. Gelatin was found to be the most suitable stabilizer for improving the body and texture of yoghurt with reduced whey separation. Addition of stabilizer's did not have much effect on the colour and flavour scores. Viscosity and curd tension significantly improved using gelatin and to a lesser extent by sodium alginate. Synersis properties of yoghurt prepared from both milks significantly improved by addition of stabilizers. SRA

746

Chawala (AK) and Balachandran (R). **Studies on yoghurt from buffalo milk: Effect of different levels of fat on chemical, rheological and sensory characteristics.** *Indian Journal of Dairy Science* 46(5); 1993; 220-222

Study indicated that higher fat content resulted in superior flavour and appearance of yoghurt, and reduced yoghurt setting time, decreased penetration value but increased viscosity. Body texture score increased upto 4.5% fat level and then decreased. Max. curd tension of 54 g was found in 0.05% fat and min. of 29 g in 1.5% fat. Result also indicated that in case of buffalo milk, 3.0% fat could be adequate for yoghurt making. SRA

Milk proteins

747

Bastier (P), Dumay (E) and Cheftel (JC). **Physico-chemical and functional properties of commercial caseinates.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 529-537

The composition, physico-chemical and functional properties of various commercial caseinates were analysed. The protein content was higher, while density and particle size were lower in Ca than in Na, K, Ca/Na or Ca/K caseinates. Ca caseinates had a significantly lower solubility index, water absorption capacity and apparent viscosity than other caseinates. The solubility index at 20 g/L (at both pH 7.0 and spontaneous pH) varied from 0.81 to 0.97 g/g for Ca caseinates, and from 0.89 to 0.99 g/g for Na or K caseinates. The water absorption capacity (Baumann apparatus, 30 min at 20°C) varied from 1.3 to 1.9 mL water/g powder (Ca caseinates) and from 2.1 to 3.2 mL/g (Na or k caseinates). The apparent viscosity at 150 s^{-1} varied from 40 to 1150 mPa.s (Ca caseinates) and from 500 to 3200 mPa.s (Na or K caseinates). For Ca caseinates, variability was observed between different batches from the same manufacturer. However, the Ca content was positively correlated to pH and negatively correlated to solubility index, rate of water absorption and apparent viscosity. These 3 latter properties were positively correlated to each other, but they were modified for mixed caseinates containing Ca plus Na or K. AA

MEAT AND POULTRY

Meat

748

Sahoo (J), Kesava Rao (V), Kowale (BN) and Yadav (PL). **Conversion of keratinous tissue from slaughterhouse by-products to food.** *Beverage and Food World* 21(1); 1994; 25-26

This review article covers amino acid composition of keratin, conversion of keratin to digestible proteins, effect of fineness of grinding, chemical processing, and utilization of keratins as human food. 26 references. BV

749

Campos (MA) and Areas (JAG). **Protein nutritional value of extrusion-cooking defatted lung flour.** *Food Chemistry* 47(1); 1993; 61-66

Raw bovine lungs were dried, ethanol-defatted and extruded at diverse temp. and moisture contents of the feed including the optimum conditions for texture formation. Amino acid composition analysis and bioassay were carried out for the protein before and after every step of processing. The effect of extrusion on the nutritional quality of lung protein was highly dependent on the moisture content of the samples for processing. The high energy inputs required for proper processing at the low moisture level, 18%, can produce irreversible chemical modification of amino acids resulting in changes in their composition or bioavailability which is not detected by chemical analysis but only through biological assays. Defatting the dried lung with solvents of lower polarity, high lipid content lung flours can be produced to get good extrusion behaviour and processable at higher moisture. SD

750

Adegoke (GO) and Sagua (VY). **Influence of different spices on the microbial reduction and storability of laboratory-processed tomato ketchup and minced meat.** *Die Nahrung* 37(4); 1993; 352-355

Six non-commercial spices 1% (w/w) (*Xylopis acethiopica*, *Aframomum melegueta*, *Monodoran myristica*, *Piper guineense*, *Icacina* spp and *Congronema latifolia*) added to lab.-processed tomato ketchup and minced meat reduced spoilage microbial populations to different levels. Tomato ketchup spiced with *M. myristica* remained sterile after 24 h incubation at room temp. (26 plus or minus 2) whilst control samples had bacterial and yeast counts of 1.5×10^7 cfu/g and 2.0×10^5 propagules/g, respectively. *X. aethiopica* also reduced bacterial populations in tomato ketchup. In spiced minced meat, only *X. aethiopica* and *C. latifolia* showed an inhibitory effect on yeasts. Other spices used were not or relatively less effective against bacteria and yeasts. BV

Beef

751

Raharjo (S), Sofos (JN) and Schmidt (GR). **Effect of meat curing agents and phosphates**

on thiobarbituric acid (TBA) numbers of ground beef determined by the aqueous acid extraction TBA C_{18} method. *Food Chemistry* 47(2); 1993; 137-143

752

Ziauddin (KS), Mahendrakar (NS), Rao (DN) and Amla (BL). **Effect of freezing, thawing and frozen storage on physico-chemical and sensory characteristics of buffalo meat.** *Meat Science* 35(3); 1993; 331-340

A study was conducted on some physico-chemical and sensory characteristics of buffalo meat frozen by plate and blast freezing and stored at -15 plus or minus 3°C for a period of 3 months. A marginal increase in pH values and drip losses were observed during the storage period. Drip losses were less in blast frozen samples. WHC, cooking losses thermal shrinkage and WB shear values indicated inconsistent results, during storage. Similar observations were recorded with regard to tyrosine and TBA values. No significant differences in the physico-chemical characteristics were observed between meat cuts and minced meat. Plate frozen meat samples scored higher for texture, juiciness and aroma. Both the plate and blast frozen meat samples, however, were similar in overall quality according to taste panel results. AA

753

Lucia (LM), Vanderzant (C) and Acuff (GR). **Potential role of *Proteus-providencia-Morganella* species in quality deterioration of beef.** *Meat Science* 35(3); 1993; 321-330

754

Butler (AJ) and Larick (DK). **Effect of antioxidants on the sensory characteristics and storage stability of aseptically processed low-fat beef gels.** *Meat Science* 35(3); 1993; 355-369

755

Barkate (ML), Acuff (GR), Lucia (LM) and Hale (DS). **Hot water decontamination of beef carcasses for reduction of initial bacterial number.** *Meat Science* 35(3); 1993; 397-401

Mutton

Lamb

756

Hagyard (CJ), Keiller (AH), Cummings (TL) and Chrystall (BB). **Frozen storage conditions and rancid flavour development in lamb.** *Meat Science* 35(3); 1993; 305-312

Frozen storage of lamb at -5 or -10°C before ultimate storage at -35°C induced changes that led to rancidity development continuing at a more rapid rate at the lower temp. Parallel storage regimes, but with storage at -35°C first, then ultimate storage at -5 or -10°C, led to much less storage flavour development. No significant flavour changes occured even after 40 wk storage at -15°C followed by 20 wk storage at -35°C. SRA

Rabbit

757

Keshri (RC), Kumar (S) and Bachhil (VN). **Quality characteristics of barbecued rabbit cuts.** *Beverage and Food World* 21(1); 1994; 36-37

Fore- and hind quarters of 6 months old New Zealand white rabbits were processed into barbecue using two recipes and quality parameters were evaluated. The av. wt. of raw quarters was 132.50 gms. The wt. loss on refrigerated chilling averaged 0.98%. The mean values of cooking yield and meat bone ratio of quarters were 69.51% and 3.99 respectively. Hind quarters barbecued with recipe containing 10% vinegar (vol./wt.) had a significantly higher ($P < 0.05$) cooking yield. Sensory scores in general, were good to very good and flavour as well as overall acceptability scores were enhanced due to addition of vinegar. Microbiological examination of freshly prepared and of refrigerated product for 1 wk revealed absence of coliforms. The total plate counts were also below the objectionable level. A significant difference ($P < 0.01$) in composition of fore- and hind-quarters was observed for moisture, protein and ether extract whereas the total ash content did not differ significantly ($P < 0.05$). The mean values for these were 56.66, 27.33, 7.27 and 3.64% respectively. AA

Products

Meat

Sausages

758

Berdague (JL), Monteil (P), Montel (MC) and Talon (R). **Effects of starter cultures on the formation of flavour compounds in dry sausage.** *Meat Science* 35(3); 1993; 275-287

The effect of 6 starter cultures of lactic acid bacteria (*Lactobacillus sake* L110, *Pediococcus acidilactici* 725, *P. pentosaceus* 716) and *Staphylococcus* species (*Staph. carnosus* 833, *Staph. warneri* 863, *Staph. saprophyticus* M31) strains were tested in 30 dry sausages without spices. Analysis of flavour compounds showed 80 volatile compounds of various origins (lipid oxidation, fermentations, amino acid catabolism) and animal feed stuffs. The sensory analyses showed that the butter odour of dry sausages largely depends on catabolism of carbohydrates and that curing and rancid odours were correlated with some typical compounds of lipid oxidation. SRA

759

Maijala (R) and Eerola (S). **Contaminant lactic acid bacteria of dry sausages produce histamine and tyramine.** *Meat Science* 35(3); 1993; 387-395

Forty-two lactic acid bacteria (LAB) strains were isolated from 7 dry sausages during 0, 21 and 49 days of ripening. Their ability to produce histamine and tyramine was studied by HPLC from broth cultures after 2 days. Histamine and tyramine concn. increased in the sausages during fermentation. 10 of the 42 LAB strains produced 402-1087 p.p.m. tyramine. 4 of these 10 LABS were also hystamine positive (725-1083). Most of the amine positive strains were found in sausages at the end of ripening and with highest amine levels. Study suggest that it could be possible to decrease the levels of amines formed by limiting the initial level and growth of these contaminant bacteria. SRA

Poultry

Chickens

760

Hwang (KT) and Maerker (G). **Determination of 6-ketocholestanol in unirradiated and irradiated chicken meats.** *Journal of the American Oil Chemist's Society* 70(8); 1993; 789-792

A method to detect 6-ketocholestanol in unirradiated and irradiated chicken meats was developed by means of chloroform-methanol-water extraction, adsorption chromatographic column separation and GC. This method is able to measure cholesterol oxidation products at levels that are much lower than those of previous methods. The new procedure was used to detect 6-ketocholestanol in fresh, unirradiated chicken and measured more than 97% of the test compound added to chicken below the p.p.m. level. Irradiation of the chicken meats to a dose of 10 kGy increased the concn. of this compound to about 4 times the level of unirradiated meats. AA

761

Sachdev (AK), Ram Gopal, Verma (SS), Kapoor (KN) and Kulshreshtha (SB). **Quality of chicken gizzard pickle during processing and storage.** *Journal of Food Science and Technology (India)* 31(1); 1994; 32-35

Vinegar-based chicken gizzard pickle stored at ambient condition and refrigeration were evaluated. Since microbial counts of red-chilli powder, turmeric, cumin, black pepper, caraway, aniseed, cinnamon and clove were high oven-drying of them before use is suggested. Changes in pH, shear force, moisture, crude protein, ether extract, thiobarbituric acid and total plate counts were faster during summer-rainy season. Product showed a shelf-life of 45 days in summer-rainy season and 75 days in water at ambient storage comparable in quality to refrigerated samples. SD

Broilers

762

Sawaya (WN), Abu-Ruwaida (AS), Baroon (ZH), Khalafawi (MS) and Murad (M). **Shelf-life of eviscerated broiler carcasses as affected by vacuum packaging and potassium sorbate.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 517-523

Packaging chicken Carcasses under vacuum and pretreating with potassium sorbate (VS), under vacuum without pretreating with potassium sorbate (V) or under air atm. after pretreating with potassium sorbate (CS), as compared with conventional packaging under air atm. (control) showed that the spoilage bacterial counts during storage at 4°C exceeded the upper limit of log 7.2 cfu/mL for the control by 25-26, 14-15 and 13-14 days after processing, and at 7°C by 16, 11 and 10-11 days respectively. These data indicated that a combination of vacuum packaging and sorbate dip can extend the shelf-life of poultry carcasses over those conventionally-packaged by an extra 18-19, 6-7 and 7-8 days at 4°C and 9, 4 and 3-4 days at 7°C, respectively. Under these conditions, the levels of *Enterobacteriaceae* were not affected substantially by either vacuum packaging of vacuum + potassium sorbate, although these levels were relatively lower than those reported using conventional packaging. The increased levels of total volatile nitrogen and decreased level of extract release vol. confirmed the positive relationship between these values and the bacterial counts of spoilage. The occurrence of certain selected spoilage bacteria, such as *Pseudomonas* and *Lactobacillus*, was substantially higher in air packaged carcasses (more at 7 then at 4°C) than in vacuum packaged ones, whereas *Lactobacillus* were predominant under vacuum conditions, independent of sorbate treatment. AA

Products

Eggs

763

Kroll (J), Rawel (H), Krock (R) and Schnaak (W). **Interaction of benzyl isothiocyanate with egg white proteins.** *Die Nahrung* 37(2); 1993; 179-181

SEAFOODS

764

Mabeau (S) and Fleurence (J). **Seaweed in food products: Biomedical and nutritional aspects.** *Trends in Food Science and Technology* 4(4); 1993; 103-107

Reviews briefly the biochemical, nutritional (polysaccharides and dietary fibres, minerals, vitamins, proteins and amino acids, lipids and fatty acids) and regulatory aspects associated with the use of seaweeds in food products. 19 references. BV

Fish

765

Hassan (F) and Sherief (PM). **Role and application of fish collagen.** *Seafood Export Journal* 251(4); 1994; 19, 21, 24

Collagen content of different types of fishes, its relation to meat texture, the application of collagen in leather industry, film industry and as medical aids in sutures, cargil membranes and surgical sponges are highlighted. GS

Cod

766

Shaltout (OE). **Chip-like cod based crackers: Acceptability and chemical composition.** *Lebensmittel-Wissenschaft und - Technologie* 26(6); 1993; 558-562

Fish chip-like crackers were prepared from wheat flour, mixtures of maize:wheat (1:1), potato:wheat (1:1) flour and meat of miced cod (*Gadus morhua*) at a flour to fish ratio of 90:10, 80:20 and 70:30. Sensory evaluation scores were highest for the following mixtures: 90% wheat flour-10% minced cod, 40% maize flour-40% wheat flour-20% minced cod, 45% potato flour-45% wheat flour-10% minced cod.

Chemical analysis showed significant increase in crude protein and ash contents, whereas, at the highest cod mince addition (20%), no significant increase in fat content was observed. An obvious improvement in the essential amino acid pattern of the highly accepted products was observed except for lysine and threonine being the most limiting as calculated by the chemical score. Nevertheless, at 20% addition of cod mince the lysine content of 40% maize flour-40% wheat flour formula greatly improved. The moisture content (6.38 - 7.42), a_w (0.32 - 0.52) and pH (5.9 - 6.1) of dried chip-like cod crackers predict a good shelf-life. AA

Mackerels

767

Srikar (LN), Khuntia (BK), Reddy (GVS) and Srinivasa (BR). **Influence of storage temperature on the quality of salted mackerel (*Rastrelliger kangurta*) and pink perch (*Nemipterus japonicus*).** *Journal of the Science of Food and Agriculture* 63(3); 1993; 319-322

Dry-salted mackerel and pink perch were stored at two temp.: ambient (26.8 plus or minus 3.3°C) and 2.5 plus or minus 1°C. Changes in moisture content, salt content, a_w, peroxide value (PV), free fatty acid (FFA) content, total volatile base nitrogen (TVBN) content, halophilic bacteria count and sensory scores for overall acceptability were studied. Loss of moisture and absorption of salt were considerably higher in the products stored at ambient temp. The decrease in a_w was more pronounced at ambient temp. than at the lower temp. Although the chemical indices of freshness (PV, FFA and TVBN) and the halophilic counts showed increasing trends, they were considerably lower in the products stored at the lower temp. Sensory evaluation for overall acceptability indicated that storage at the lower temp. could considerably extend the shelf-life of salted fish. AA

Sardines

768

Satish (MS), Hiremath (GG) and Dora (KC). **Non-solvent removal of fat from minced meat of oil sardine (*Sardinella longiceps*).** *Indian Journal of Nutrition and Dietetics* 28(4); 1991; 122-124

Minced meat of oil sardine was defatted by (i) simple water blanching, (ii) cooking, (iii) cooking followed by washing, (iv) treating with 1% sodium bicarbonate, and (v) 1% acetic acid followed by washing with cold and hot water (35 - 40°C). 90% of the fat of oil sardine meat could be removed by treatment (v), administered for 15 min. The greyish meat obtained showed acceptable quality. GS

Products

Fish

769

Udgata (SK) and Khuntia (BK). **Chitin and chitosan - the promising shell utilization.** *Seafood Export Journal* 25(14); 1994; 5, 7-8

The crustacean wastes contain about 10% chitin on dry wt. basis. Chitin and its derivative chitosan have several industrial applications like textiles, photography, medicine, agriculture, food processing, chromatography and animal feed. The methods of preparation of chitin and chitosan from this fishery waste are discussed. GS

PROTEIN FOODS

Infant foods

770

Allegri (G), Biasiolo (M), Costa (C), Bettero (A) and Bertazzo (A). **Content of non-protein tryptophan in human milk, bovine milk and milk-and soy-base formulas.** *Food Chemistry* 47(1); 1993; 23-27

Colostrum contains much more of both the forms of non-protein tryptophan (NPT) than mature human milk (HM) and bovine milk (BM) and free tryptophan (%) also is higher in HM. NPT in fresh commercial BM is similar to those of BM 1 month after delivery. Both forms of NPT also are much higher in soybean than BM formulas but the values are significantly lower than in colostrum. SD

771

Almeida-Dominguez (HD), Serna-Saldivar (SO), Gomez (MH) and Rooney (LW). **Production and nutritional value of weaning foods from mixtures of pearl millet and cowpeas.** *Cereal Chemistry* 70(1); 1993; 14-18

Weaning foods (WF) were produced by mixing decorticated and press-dried pearl millet (70%) and cowpea (30%) with and without sorghum malt (SM). Decorticated millet and cowpea flours were cooked into a slurry and press-dried to produce flakes. The heat applied during cooking of the slurry and press-drying was designed to develop proper paste properties for the preparation of porridge like WF. SM hydrolyzed the starch and produced a beverage that contained 17% protein with 90% of the essential amino acids required for infants < 1 yr old. AA

772

Paul (SC) and Mathur (BN). **Development of a low lactose infant formula. Part IV. Storage related changes in the chemical characteristics.** *Indian Journal of Dairy Science* 46(8); 1993; 377-380

Investigation was carried out for the assessment of storage related chemical changes taking place in a low lactose infant formula (LIF) having 20, 35, 50% of lactose hydrolysis of total lactose. No chemical changes were observed in the LIF samples under double nitrogen gas packing during storage at 37°C for period of 1 yr. The level of PM in LIF remained constant (6.30) irrespective of the level of hydrolysis. The changes in hydroxy-methyl furfural content and available lysine content were relatively higher in LIF sample within 50% level of lactose hydrolyses. The shelf-life at 37°C is estimated to be 6, 5 and 4 months for LIF 20, LIF 35, LIF 50 respectively. SRA

773

Paul (SC) and Mathur (BN). **Development of a low lactose infant formula (LIF). Part V. Nutritional characteristics (LIF) in relation to protein-carbohydrate interaction.** *Indian Journal of Dairy Science* 46(8); 1993; 381-386

This investigation was directed at the characterization of protein-carbohydrate interaction in a spray-dried low-lactose infant formula (LIF) in relation to the degree of lactose hydrolysis. The effect of such interaction on the nutritional parameters of the lactose hydrolyzed spray-dried product was also evaluated. Gel chromatography was employed to isolate the protein carbohydrate interaction products formed during processing. The fractions of whey protein involved 'with interaction with carbohydrates in descending order were found to be serum albumin; β-lactoglobulin and α-lactalbumin B. With the progress in the degree of lactose hydrolysis in the LIF a loss was observed in PER, NPU and available lysine content being 2.96, 81.34 and 0.77% for LIF-20; 2.80, 7.17 and 0.73% for LIF-35; and 2.66, 67.63 and 0.68% for LIF-50, respectively. Irrespective of the extent of lactose hydrolysed, the lysine content of LIF samples decreased steadily with the progress in the storage period indicating a progressive loss in the nutritional adequacy of the product. Availability of lysine in the stored sample seemed to be the limiting factor in the detn. of the shelf-life of the prepared formula. AA

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beers

774

Pearce (TC), Gardner (JW), Friel (S), Bartlett (PN) and Blair (N). **Electronic nose for monitoring the flavour of beers.** *Analyst (London)* 118(4); 1993; 371-377

An electronic instrument is described that has been designed to measure the odour of beer and supplement or even replace existing analytical methods. The instrument consists of an array of up to 12 conducting polymers, each of which has an electrical resistance that has partial sensitivity to the headspace of beer. The signals from the sensor array are then conditioned by suitable interface circuitry and processed using a chemometric or neural classifier. The results of the application of multivariate statistical techniques are given. The instrument, or electronic nose is capable of discriminating between various commercial beers and, more significantly, between standard and artifically-tainted beer. An industrial version of this instrument is now undergoing trials in a brewery. BV

Wines

775

Garcia-Jares (C) and Medina (B). **Research on white and red wine blending in the production of rose wines by means of the partial least squares method.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 349-354

The difficult problem of recognizing wine blends in rose wines is assessed using a powerful statistical method called partial least squares. Genuine rose wines are first detected using a 280 nm/320 nm spectrophotometric ratio. Blends of white and red wine are used as a calibration set and for an evaluation set of known composition. The proposed method evaluates the respective percentage of red and white wine in a blend and the error associated with the prediction. A comparison is made with principle component regression. AA

Non-alcoholic beverages

Coffee

776

Rogers (PJ) and Richardson (NJ). **Why do we like drinks that contain caffeine ?.** *Trends in Food Science and Technology* 4(4); 1993; 108-111

Analyses the mechanisms underlying the choice, consumption and liking for caffeine - containing drinks; psychoactive effects of caffeine on the mood, performance and behaviour; and side effects of caffeine withdrawal such as lethargy, irritability, depression and headache. GS

777

Boccas (F), Roussos (S), Guitierrez (M), Serrano (L) and Viniegra (GG). **Production of pectinase from coffee pulp in solid state fermentation system: Selection of wild fungal isolate of high potency by a simple three-step screening technique.** *Journal of Food Science and Technology (India)* 31(1); 1994; 22-26

248 cultures isolated from Mexico's coffee growing areas were screened and potent cultures selected. *Aspergillus niger* CH_4 a pectolytic strain was the reference. First, pectolytic activities of 248 fungal strains on a selective solid agar medium were evaluated; next the pectolytic activities of the 13 selected isolates quantified in a submerged fermentation medium with pectin as the sole carbon source and finally the 4 selected fungal isolates assayed for their capacity to produce pectinase from coffee pulp by solid state fermentation. *Asp. niger* V22 B35, a wild strain, produced 4 times more pectinase than the reference. SD

Fruit juices

Apple juices

778

Poll (L). **The effect of pulp holding time and pectolytic enzyme treatment on the acid content in apple juice.** *Food Chemistry* 47(1); 1993; 73-75

It is shown that malic acid was enzymatically reduced during the period from pulp production until pressing of the juice (pulp holding time). After 8 and 24 h pulp holding time the malate content was reduced by 50% (70% of the original content). Corresponding figures for titratable acid were 62% and 81%. Pectolytic enzyme treatment resulted in higher malate and titratable acid content than the control due to pectin esterase activity of the added enzymes and probably due to better extraction of the malate from the pulp. AA

Guava juices

779

Khurdiya (DS) and Srivastava (S). **Effect of enzymes, lye peeling and condition of fruits on the quality of guava juice.** *Indian Food Packer* 48(2); 1994; 5-10

Enzymes, lyepeeling and condition of guava fruits greatly influenced the pectin, tannins, ascorbic acid and yellow index of the liquefied juice. The pectin content of the juice was in the range of 0.062 to 0.704%. The juice from unpeeled, more green than yellow guava possessed higher pectin (16.71%) and tannins (7.03%) in comparison with that of yellow with green tinge fruit. The ascorbic acid content of juice was in the range of 53.66 to 98.39 mg/100 ml. Lye peeling caused reduction in pectin (25%), tannins (22-25%), ascorbic acid (25-30%) and yellow index (7-16%) of the liquefied juice. The juice and nectar prepared from lye peeled yellow with green tinge fruit obtained highest colour (7.21 and 7.77) and flavour (7.21 and 7.18) scores respectively. GS

Oranges juices

780

Bankole (SA). **Fungi associated with post-harvest rot of sweet orange (*Citrus synensis*) and aflatoxin B_1 production by isolates of *Aspergillus flavus* on plain and supplemented orange juice.** *Die Nahrung* 37(4); 1993; 380-385

Samples of rotting sweet orange (*Citrus sinensis*) were obtained from the depots, sales counters and waste baskets. Fungi, associated with rotting fruits were isolated and identified. Out of 12 species of fungi isolated, 8 are known to be producers of toxins. The 7 isolates of *Asp. flavus* obtained were screened for aflatoxin production in a nutrient sol., and 4 were found to be aflatoxigenic, producing primarily aflatoxin B_1. Aflatoxin B_1 production of the toxigenic isolates were further studied on plain juice and juice separately supplemented with 2.0% yeast extract and 2.0% sucrose. The highest yield of aflatoxin B_1 was produced on juice supplemented with yeast extract by the 4 toxigenic *Asp. flavus* isolates, followed by sucrose supplementation while the lowest amount of aflatoxin B_1 was detected on plain juice. Optimum temp. for aflatoxin B_1 production by *Asp. flavus* isolate (IBA-O1) was 25°C to 30°C, for an incubation period of 7-11 days on plain and supplemented juce media. AA

Watermelon juices

781

Saini (SPS) and Bains (GS). **A new method for mechanized production of watermelon seeds and juice.** *Indian Food Packer* 48(2); 1994; 55-57

A new process for the mechanized extraction of seed and juice simultaneously was experimented with watermelons samples of 200 kg of each cv. i.e. H 23 and Shipper. A method for the production of vitaminized watermelon juice was also introduced. Fresh juice was low in TSS (8.4 and 8.6°Brix), poor in acidity (0.05 and 0.08%) and high pH. Both the var. were poor in ascorbic acid. Their vitamin C content was improved by ascorbic acid fortifications before bottling. Bottled juice stored well over a period of 26 wk under ambient (12-40°C) conditions. Mechanical extraction being more economical gave higher seed yield than the traditional manual extraction process. GS

Sugarcane juices

782

Sivasubramanian (CC) and Pai (JS). **Effect of heat treatments on the quality of sugarcane juice.** *Indian Food Packer* 48(2); 1994; 51-54

Sugarcanes of var. co 419 were blanched (i) with peel, (ii) with partial peeling and (iii) after complete peeling. Blanching treatment with partial peeling of the sugarcanes for 15 min in steam gave an acceptable colour for the juice. HTST pasteurization brought about max. flavour retention. Degradation products of sugar during storage increased the off-flavour with unacceptable colour with the juice. GS

Tea

783

Tomas (C), Celeste (M), Cladera (A), Gomez (E), Estela (JM), Cerda (V). **A new flow-injection spectrophotometric method for the determination of tannins in tea and beer using iron (III) and 1,10-phenanthroline.** *Food Chemistry* 47(2); 1993; 201-204

Automatic sample injection, data acquistion and processing was controlled by a personal computer with the FIA set-up. The calibration curve between 0-30 mg/litre gallic acid was linear and the relative standard deviation for a standard containing 10 mg/litre gallic acid was 0.7% (n=10). The sample throughput of 60 sample/h was achieved. In this method, no pretreatment of sample to avoid interferences was required but only appropriate sample dilation and so more reliable results in substantially shorter period were obtained. SD

FATS AND OILS

Oils

784

Marangoni (AG), McCurdy (RD) and Brown (ED). **Enzymatic interesterification of triolein with tripalmitin in canola lecithin-hexane reverse micelles.** *Journal of the American Oil Chemist's Society* 70(8); 1993; 737-744

785

Frankel (EN). **Formation of headspace volatiles by thermal decomposition of oxidized fish oils vs oxidized vegetable oils.** *Journal of the American Oil Chemist's Society* 70(8); 1993; 767-772

To understand the reasons for differences in oxidative stability among edible oils, the temp. dependence was investigated for the development of volatile lipid oxidation products in fish oils and in vegetable oils. A rapid headspace capillary GC method was developed to determine volatile oxidation products of ω-6 (n-6) polyunsaturated fats (pentone and hexanal) and ω-3(n-3) polyunsatur fats (propanal) at different decomposition temp. Headspace GC analyses of partially oxidized menhaden, bonita and sardine oils could be performed at 40°C, whereas soybean, canola, safflower, high-oleic sunflower and high-oleic safflower oils required temp. > 100°C. Volatile formation by thermal decomposition of oxidized oils had lower apparent activation energies in fish oils than in vegetables oils, and significantly higher apparent activation energies in high-oleic oils than in polyunsaturated oils. The activation energy data on headspace volatiles provided another dimension toward a better understanding of the thermal stability of flavour precursors in unsaturated fish and vegetable oils. AA

786

Iskander (FY). **Determination of seventeen elements in edible oils and margarine by instrumental neutron activation analysis.** *Journal of the American Oil Chemist's Society* 70(8); 1993; 803-805

Instrumental neutron activation analysis was used to determine the concn. of As, Ba, Ce, Co, Cr, Cs, Eu, Fe, Hg, K, Na, Rb, Sb, Se, Sr and Zn in almond, sunflower, peanut, sesame, linseed, soy, corn and olive oils, as well as in 3 margarine brands. The concn. of As, Ba, Ce, Cs, Eu, Hg, Rb, Se and Sr were below the system detection limit under the exp. conditions. Cr was detected only in one of the margarine samples (171 μg/g); Sb only in corn oil (18 ng/g) and Sc only in linseed oil (19 ng/g). Co, Fe, K, Na and Zn were detected in all oil and margarine samples investigated. The concn. ranges for Co, Fe, K, Na and Zn in oils were: 0.016-0.053; 4.45-19.1; 5.93-47.2; 2.44-12.9 and 0.48-1.54 μg/g, respectively. For margarine, the concn. ranges for Co, Fe, K, Na and Zn were 0.09-0.012; 4.53-10.6; 58.3-1140; 13.2-9870 and 0.38-0.47 μg/g, respectively. The elemental contents of the analyzed samples are within the ranges reported in the literature for edible oils and fats. AA

Avocado oils

787

Bizimana (V), Breene (WM) and Csallany (AS). **Avocade oil extraction with appropriate technology for developing countries.** *Journal* *of the American Oil Chemist's Society* 70(8); 1993; 821-822

Extraction of oil from avocado fruit mesocarp tissue were compared and modified for the purpose of creating applicability in developing countries. Highest recoveries were obtained at a 5:1 water-to-avocado ratio, pH 5.5 and centrifugal force of 12,300 X g. Addition of 5% $CaCO_3$ or $CaSO_4$ allowed extraction without organic solvents. The relationship was linear between heating temp. (75-98°C) and the time for oil release from slurries. Gravity settling for 4 days at 37°C followed by centrifugation improved oil yield. Optimal oil recoveries were 70-80%. AA

Canola oils

788

Adu-Peasah (SP), Diosady (LL) and Rubin (LJ). **A multistage hydrocyclone/stirred-tank system for countercurrent extraction of canola oil.** *Journal of the American Oil Chemist's Society* 70(8); 1993; 755-762

Ground canola seed containing 46.9% oil (A) and partially extracted meal, similar to pre-pressed meal containing 13.7% oil (B), were ground in a methanol/ammonia/water sol., filtered to remove antinutrients and extracted countercurrently with hexane in a multistage hydrocyclones/stirred-tank extraction unit. An empirical model was developed for predicting the yield (i.e., oil recovery) from the process. Based on the model calculations, a 6-stage unit operating at a hexane-to-meal ratio (R) of 6.2 L/kg was required for processing meal A. The calculated oil recovery was 98.3%, resulting in a meal containing 0.7% residual oil. Meal B required a 5-stage unit operating at R = 5.7 L/kg. The calculated oil recovery was 99.2% with 0.6% residual oil in the meal. The calculations were confirmed experimentally with two- and four-stage crosscurrent extraction processes. AA

Citrus seed oils

789

Ajewole (K) and Adeyeye (A). **Characterisation of Nigerian citrus seed oils.** *Food Chemistry* 47(1); 1993; 77-78

The oil content of the 6 citrus seed oils from Nigeria viz *Citrus sinensis*, *C. paradisi*, *C. aurantium*, *C. reticulata*, *C. aurantifolia* and tanglo (a hybrid between *C. paradisi* and *C. reticulata*) ranged from 24 to 41%; major fatty acids (palmitic) from 12.1 to 28%, oleic from 26.1 to 45.3% and linoleic from 29 to 38%. Stearic and linolenic were the other fatty acids. The uinsaturation of the oils ranged to high degree from 67.3 to 86.2%. The physico-chemical properties and fatty acid compositions compared well with good quality vegetable oils. Their high degrees of unsaturation reduce the probability of aiding heart diseases. Consequently, refining could provide a useful component for edible oil formulation. SD

Palm oils

790

Hariharan (K) and Raina (PL). **Influence of long term feeding of palm oil on the lipid composition of perirenal adipose tissue in rats.** *Die Nahrung* 37(4); 1993; 374-379

The composition of perirenal adipose tissue in Wistar strain of rats fed palm oil (PO) fat at 5% and 20% in diet for a period of 18 wks was studied. Peanut oil (PNO) at 5% and 20% were used as controls. Under the experimental conditions, the saturation index was higher in animals fed diet containing PO compared to those fed PNO. There was no significant difference with reference to 12:0, 14:0 and 18:1 fatty acid levels, whereas linoleic acid (18:2) showed a proportional relationship between the intake and perirenal adipose tissue levels. There was a significant correlation of dietary intake of linoleic acid and the U/S ratio in the adipose tissue. Linoleic acid (18:2, n6) levels were increased in 20% PNO groups as compared to those fed PO. However, palmitoleic acid (16:1) did not show a proportional relationship between the intake and adipose tissue levels. Thus, the study shows that more saturated fatty acids are incorporated in the PO groups than in the PNO groups at the end of 18 wks feeding. AA

791

Mohankumar (C), Arumughan (C) and Kaleysa Raj (R). **Histochemical changes in mesocarp of oil palm (*Elaeis guineensis*) fruit during development.** *Journal of Food Science and Technology (India)* 31(1); 1994; 19-21

Immature mesocarp cells of oil palm fruit (12 wks after anthesis) were thin-walled and oval-shaped with intercellular spaces, while mature mesocarp contained densely packed thick-walled polygonal cells, filled with numerous oil bodies (oleosomes), 24 wks after anthesis. Unlike oilseeds, the oil palm fruit mesocarp contains fat and fibres as the major storage and structural components. Structural components increased slowly during the early stages of fruit development (4 to 16 wks), followed by a steep increase in the mature stages (20 to 24 wks). similarly, the lipid content in the fresh mesocarp increased steeply from 7% at 16th wk to 48% by 24th wk after anthesis. Proteins and sugar, though minor constitutents, also showed a progressive increase. AA

792

Desai (BJ) and Dubash (PJ). **Recovery of carotenes from crude palm oil by adsorption method.** *Journal of Food Science and Technology (India)* 31(1); 1994; 60-61

Acid-treated bentonite and alumina gel mixture, as adsorbents in varying ratios, recovered significant amounts of carotenoids from crude palm oil, without affecting its quality. As the clay level increased, the amount of residual carotenoids in the palm oil decreased. The max. adsorption of 79% carotenoids was possible at 4:1 ratio of bentonite and alumina gel. AA

Rice bran oils

793

Gopala Krishna (AG). **Isolation and identification of the causative factors responsible for colour fixation in rice bran oil.** *Journal of the American Oil Chemist's Society* 70(8); 1993; 785-788

Crude and dewaxed rice bran oil of 6.8% free fatty acids were fractionated on a silica gel column to get a dark-coloured material (0.57% of the oil). TLC analysis of the material showed a spot corresponding to monoglycerides, but there were no spots corresponding to other glycerides. Traces of P (< 0.1 p.p.m.), Fe (1.3 p.p.m.) and 12% non-saponifiable matter was also observed. Palmitic, oleic and linoleic acids were identified after GC analysis. GS

SPICES AND CONDIMENTS

Spices

794

Kaul (M) and Taneja (N). **Microbial load of common Indian spices.** *Indian Journal of Nutrition and Dietetics* 27(8); 1990; 237-242

Five to six samples of omum (Ajowan), asafoetida (Hing), fenugreek (Methi), big cardamom (Badi elaichi), small cardamom (Chhoti elaichi), cinnamon (Dalchini) and cloves (Lavang) were heated at different temp. for varying periods of time to see the effect of dry heat on their aerobic count. The total count ranged between 10^7 CFU/g in fenugreek and cloves to 10^2 CFU/g in asafoetida and big cardamom. The total gram negative count ranged from 0 in cloves, big and small cardamoms to 10^7 CFU/g in asafoetida. The counts varied between spices as well as between samples of the same spice. The bacterial spore count constituted 50 to 90% of the total aerobic count being max. in fenugreek and asafoetida (10^5 CFU/g). Heating of spices for 1 h at 120°C reduced the microbial load considerably. GS

795

Meena (MR) and Sethi (V). **Antimicrobial activity of essential oils from spices.** *Journal of Food Science and Technology (India)* 31(1); 1994; 68-70

Essential oils from spices viz. ginger, cumin, ajowan, coriander, basil, clove and mustard as well as eugenol showed various degrees of inhibition against *Aspergillus niger*, *Saccharomyces cerevisiae*, *Mycoderma* sp., *Lactobacillus acidophilus* and *Bacillus cereus*, as determined by paper disc agar diffusion method. *Mycoderma* sp. was the most susceptible, while *B. cereus* was most resistant towards all the spice essential oils. Greater antimicrobial activity was observed in allyl-iso-thiocyanate (volatile oil of mustard), followed by oil of ajowan and eugenol, both at ambient temp. and 37°C. The oils from other spices were less effective. AA

Chillies

796

Lownds (NK), Banaras (M) and Bosland (PW). **Relationships between postharvest water loss and physical properties of pepper fruit (*Capsicum annum* L.).** *Hortscience* 28(12); 1993; 1182-1184

'Keystone' 'Nu Mex Naky' and 'Santa Fe Grande' peppers, differing in physical characteristics were stored at 8, 14 or 20°C. Water-loss rate (WLR) increased linearly with storage time at each temp. and was different for each cv. WLR was positively correlated with initial water content at 14 and 20°C, surface area (SA):val. ratio at all temp. and cuticle thickness at 14 and 20°C. WLR was negatively correlated with SA and epicuticular wax content at all temp. Stomata were absent on the fruit surface, and epicuticular wax was amorphous for each cv. SRA

Coriander

797

Pino (J), Borges (P) and Roncal (E). **Compositional differences of coriander fruit oils from various origins.** *Die Nahrung* 37(2); 1993; 119-122

The composition of the volatile oil of coriander fruit of different geographical origins was investigated by means of GLC, column chromatography and coupled GC-MS. The 18 most important components were identified and quantified. BV

Cumin

798

Borges (P) and Pino (J). **The isolation of volatile oil from cumin seeds by steam distillation.** *Die Nahrung* 37(2); 1993; 123-126

The isolation of the essential oil of cumin seeds by steam distillation is described. The chemcial composition of the oil is investigated by means of chromatographic-spectrometric methods and physico-chemical indices. The 17 most important components are identified and quantified. AA

Pepper

799

Borges (P) and Pino (J). **Preparation of black pepper oleoresin by alcohol extraction.** *Die Nahrung* 37(2); 1993; 127-130

Black pepper oleoresin was prepared by alcohol extraction. Product characteristics and yields obtained by maceration and SOXHLET extraction were compared. The most attractive process was maceration and its influence on volatile oil composition was also evaluated by capillary GLC. AA

Condiments

Chutneys

800

Chauhan (SK), Lal (BB) and Sharma (R). **Development of instant dehydrated wild pomegranate chutney.** *Journal of Food Science and Technology (India)* 31(1); 1994; 58-59

Five combinations (T_1, T_2, T_3, T_4 and T_5) of wild pomegranate (WP) chutney was prepared. T_1 - T_5 contained 250 g WP, 5 g coriander leaves and 10 g mint leaves and sodium benzoate. Green chillies were used at 5, 10, 15, 15 and 20 g in T_1 - T_5 respectively. Sugar in 10 g and 15 g quantities was added only in T_4 and T_5 respectively. T_3 contained good amounts of vitamin C, sugar, ash and fibre. The product reconstituted well in cold water, possessed all characteristics of fresh chutney and had a shelf-life of more than 6 months. BV

Essential oils

801

Gundidza (M), Deans (SG), Kennedy (AI), Mavi (S), Waterman (PG), Gray (AI). **The essential oil from *Heteropyxis natalensis* Harr: Its antimicrobial activities and phytoconstituents.** *Journal of the Science of Food and Agriculture* 63(3); 1993; 361-364

The essential oil (EO) of *H. natalensis* (the lavender tree) obtained by steam distillation was tested for antimicrobial properties. The EO exhibited considerable inhibitory activities against food poisoning bacteria and mycotoxigenic fungi. GC-MS analysis indicated the EO contained 1,8-cineole, limonene, β-myrcene, α-phellandrene and α-pinene. BV

SENSORY EVALUATION

Nil

FOOD STORAGE

802

Lal (S), Lal (J), Arora (KK), Shiv Shankar and Kumar (V). **Development of suitable sealing mechanism for fumigation covers in commercial godown in India.** *Bulletin of Grain Technology* 31(1); 1993; 3-5

New technology of sealing mechanism for fumigation covers in fumigation of foodgrain in commercial warehouses is described. The sealing mechanism consists of LDPE channel to be embeded on the godown floor surrounding the area of stack. The rubber pipe is to be fixed in the channel for sandwiching the fumigation covers after fumigating the stack. This technology was compared with existing operational technique of sealing fumigation covers. The new system of sealing mechanism was found completely air tight, more scientific, effective, less expensive and less laborious as compared to the present operational technique. Thus, the applicability of the system for commercial godowns stands established from technical and operational points. Only traces of gas leakage (within allowable limits) due to improper arrangement of the cover and fixing of rubber pipe were observed. AA

803

Chaudhary (SD), Gupta (DS) and Chaudhary (OP). **Popularity and efficiency of storage structures in rural Haryana.** *Bulletin of Grain Technology* 31(1); 1993; 26-31

Samples of grains from rural storage structures from Haryana, India, were collected in 3 seasons. Infestation, being found in all the storage structures, was max. in kothies (24.3%) followed by heaps in living rooms (21.6%), bags kept without Bhusa (18.3%), separate store rooms (17.7%), Bhukhari (16.8%) and metal bins (10.8%). Among smaller storage structures max. infestation was in Harra (82.8%) followed by Padkhala (28.0%), Parchhattis (2.2%) and wooden boxes (7.2%). Bags kept in Bhusa, although were not commonly used, showed very little infestation (0.3%). GS

INFESTATION CONTROL AND PESTICIDES

804

Velumani (SA), Thirupathi (TV), Planiswamy (PT) and Mohan (TS). **Process development for defatted neem kernel powder (DFNKP) preparation for the pest control.** *Bulletin of Grain Technology* 31(1); 1993; 6-9

A process for extracting max. active principle in neem Azadirachtin is described. The DFNKP so extracted is used at the rate of 0.05, 0.2, 0.25, 0.5 and 1% concn. (wt./wt) for the control of pulse beetle, rice weevil and paddy lesser grain borer. DFNKP controlled the pests better than raw neem kernel powder and was most effective at a concn. of 1 g/kg of seed. GS

805

Sharma (DL) and Kaur (P). **Effect of infra-red radiations on rust red flour beetle *Tribolium castaneum* (HERBST) - a pest of stored grains.** *Bulletin of Grain Technology* 31(1); 1993; 10-12

Samples of stored grains containing *Tr. castaneum* and infested grains were exposed to infra-red radiation from a distance of 20 cms for 5, 10 and 20 min. The mortality of insects was found to be 58, 87 and 100% respectively. The distance between the sample and radiation point was increased to 40 cm and samples were exposed to 20, 30 and 40 min. The mortality of insects was 25, 77 and 100% mortality of *Tr. castaneum* was achieved in samples exposed to radiation at 40 cm distance for 40 min and can be used for controlling stored grain insects. BV

806

Singh (VN), Pandey (ND) and Singh (YP). **Efficacy of vegetable oils for the control of *Callosobruchus chinensis* Linn. infesting gram and their subsequent effect on germination.** *Bulletin of Grain Technology* 31(1); 1993; 13-16

Twelve vegetable oils, viz., sesamum (*Sesamum indicum* L.), sunflower (*Helianthus annuus* L.), soybean (*Glycine max L. Merr*), linseed (*Linum usitatissimum L.*), mustard (*Brassica juncea L.*), safflower (*Carthamus tinctoria L.*) karad (*Raphanus sativus L.*), castor (*Ricinus communis L.*), coconut (*Cocos nucifera L.*), groundnut (*Arachis hypogaea L.*), rice bran (*Oryza sativa L.*) and taramira (*Eruca sativa L.*) were evaluated as grain protectant at 1 ml and 3 ml/kg seed of gram against infestation caused by *C. chinensis Linn.* The least reduction in grain wt. by the grubs was recorded in seeds treated with the oil of castor, soybean, taramira, mustard, coconut, groundnut, safflower, rice bran and sunflower at 1 ml/kg seed, whereas there was no damage at all in seeds treated with the oil of castor, soybean, mustard and taramira at 3 ml/kg seed. All treatments were found superior to control. Almost similar trend was also observed in damaged grain of gram seeds treated with 2 dosages of oils at 1 ml and 3 ml/kg seed. AA

807

Monro (JA). **A nutritionally valid procedure for measuring soluble dietary fibre.** *Food Chemistry* 47(2); 1993; 187-193

Being different from the current methods, soluble fibre is extracted before and separately from starch digestion and use sequential gastric and intestinal media. The method extracted less fibre, was sensitive to the effects of cooking, comparable in degree of fibre extraction to *in-vivo* conditions (in the rat model) and was highly sensitive to pH. SD

BIOCHEMISTRY AND NUTRITION

808

Randhawa (RK) and Kawatra (BL). **Effect of dietary protein on the absorption and retention of Zn, Fe, Cu, and Mn in pre-adolescent girls.** *Die Nahrung* 37(4); 1993; 399-407

Three experimental diets, viz. habitually consumed diet (D1), D1 + 34 g pulses (D2), D1 + 190 ml milk (D3) were fed to 18 healthy pre-adolescent girls of low-socio-economic group. The additional amount of pulses/milk provided 8 g of additional protein/day. The overall results indicate that the supplementation of habitually consumed diet with a small amount of milk greatly improved the absorption and retention of trace minerals. Min. daily intake of Zn, Cu and Mn required to maintain equilibrium of these minerals in pre-adolescent children was calculated using the prediction equations and was found to be 8.77, 2.01 and 1.91 mg, respectively. The requirement of Fe could not be calculated due to wide variations among the subjects. AA

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

Nil

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE - 570 013

(MANPOWER DEVELOPMENT TRAINING SCHEDULE FOR 1994-95)

03 AUG 94 to 19 AUG 94	**FUMIGATION, PEST CONTROL & PROPHYLACTIC TREATMENTS**	CFTRI, Mysore
22 AUG 94 to 02 SEP 94	**BASICS OF FLOUR MILLING**	Flour Milling Technologist Assn.
05 SEP 94 to 16 SEP 94	**TECHNIQUES IN SOLID STATE FERMENTATION**	CFTRI, Mysore
19 SEP 94 to 23 SEP 94	**WORKSHOP ON BAKERY SCI. & TECH. FOR MFIL**	US Wheat Associates, New Delhi
26 SEP 94 to 13 OCT 94	**POST HARVEST TECH. OF FRUITS & VEGETABLES**	CFTRI, Mysore
17 OCT 94 to 21 OCT 94	**TRANSPORT PACKAGING FOR FOOD PRODUCTS**	CFTRI, Mysore
24 OCT 94 to 28 OCT 94	**RODENT CONTROL**	CFTRI, Mysore
14 NOV 94 to 02 DEC 94	**TECHNOLOGY OF FRUIT & VEGETABLE PRODUCTS**	CFTRI, Mysore
05 DEC 94 to 16 DEC 94	**HEAVY METAL CONTAMINANTS**	ICMR, New Delhi
19 DEC 94 to 30 DEC 94	**CONVENIENCE FOODS ON MEAT AND POULTRY**	Min. Fd. Processing, Govt of India
02 JAN 95 to 13 JAN 95	**TECH. ON STORAGE, PROCESSING & QC OF FD GRAINS**	FCI, New Delhi
16 JAN 95 to 27 JAN 95	**ALCOHOLIC BEVERAGES & QC INCLUDING ALCOHOLIMETRY**	Excise Dept., Karnataka Govt.
30 JAN 95 to 03 FEB 95	**MILLING AND PARBOILING OF RICE**	CFTRI, Mysore
06 FEB 95 to 17 FEB 95	**BAKING SCIENCE AND TECHNOLOGY**	US Wheat Associates, New Delhi
20 FEB 95 to 03 MAR 95	**AFLATOXIN ANALYSIS IN FOODS AND FEEDS**	CFTRI, Mysore
06 MAR 95 to 10 MAR 95	**COCOA PRODUCTION, PROCESSING AND PRODUCTS**	CFTRI Mysore & CPCRI Karaikudi
13 MAR 95 to 24 MAR 95	**FOOD ANALYSIS & QUALITY CONTROL UNDER THE FOOD LAWS**	CFTRI, Mysore

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GENERAL

809

Arora (KL), Adhikari (K) and Verma (NK). **Cost estimation for the manufacture of Mellorine type frozen desserts.** *Beverage and Food World* 21(2); 1994; 15-17

The cost for the manufacture of Mellorine-type frozen desserts using groundnut oil and hydrogenated-fat was estimated and compared with milk fat ice cream. The cost of manufacturing Mellorine containing hydrogenated-fat and GMS was the lowest Rs. 1.04/100 ml. The cost was Rs. 1.09 when emulsifier was replaced with Tween-80. The cost of groundnut oil Mellorine using Tween-80 and GMS were Rs. 1.11 and 1.09/100 ml. Mellorine type frozen desserts were found to be cheaper by 17-21% as compared to ice cream (Rs. 1.32) using butter fat. SRA

810

Fromhold-Treu (I). **A survey on digital picture processing in food science. Part 5. Detection of lines and edges by local operators.** *Die Nahrung* 37(3); 1993; 193-203 (De)

Methods for detection of lines and edges with the aid of local operators play an important role in the field of image segmentation. Starting from the definitions of a line element and an edge element 2 kinds of mathematical descriptions for the line and edge detection will be shown. Two examples demonstrate the practical application. AA

811

Fromhold-Treu (I). **A survey on digital picture processing in food science. Part 6. Further local operators for the detection of lines and edges.** *Die Nahrung* 37(3); 1993; 204-213 (De)

Several gradient-operators are considered in a uniform description and their properties are studied. Related to the quality of the detected edges the operators differ only slightly. More important differences appear in sensitivity of noise and computer cost. If the pictures are not noisy the Roberts-gradient and the 3 x 3-average-difference-operator yield good results with low computer cost. AA

812

Fromhold-Treu (I). **A survey on digital picture processing in food science. Part 7. Detection of edges using information of direction.** *Die Nahrung* 37(3); 1993; 214-219 (De)

Most of the algorithms for edge- and line-detection use the amount of the gradient of the gray-level-function as a criterion for the presence of edge- and line-elements. If the gray-level-function in a square window is interpreted as a n x n-matrix of a n^2-dimensional vector-space then the orientation of the elements of this vector-space related to special subspaces can take as a new criterion. Furthermore 2 methods for noise discrimination in gradient pictures are described. AA

FOOD PROCESSING

813

Loaharanu (P). **Cost/benefit aspects of food irradiation.** *Food Technology* 48(1); 1994; 104-108

This article is a summary of the symposium working group's report and recommendations. Aspects covered are effectiveness and safety of food irradiation, controlling food-borne diseases, reducing food losses, expanding food trade, technology transfer, electron beam facilities and contract irradiators. CSA

814

Sunderland (R). **Continuous breading production by extrusion cooking.** *Cereal Foods World* 38(9); 1993; 685-688

The author compares breading production in conventional and extrusion processes and then traces the steps and components in the continuous extrusion process. CSA

FOOD PACKAGING

Packaging materials

815

Olafsson (G), Jagerstad (M), Oste (R), Wesslen (B) and Hjertberg (T). **Effects of different organic acids on the adhesion between polyethylene film and aluminium foil.** *Food Chemistry* 47(3); 1993; 227-233

Acetic, propionic, citric and lactic acid sol. (3% wt./wt.) were packed in LDPE/paper/LDPE/Al foil/LDPE envelopes and stored at room temp. for 4 wks. Acetic acid causing total delamination within a few days followed by a recovery back to 50% of the initial value after 2 wks confirmed earlier reports. Propionic acid showed total delamination of LDPE and foil after 8 days and remained the same for the rest of the period. The package in contact with citric acid, lactic acid and water did not show any marked change in adhesion or salt layer formation but both acetic and propionic acids formed salt layer. SD

FOOD ENGINEERING AND EQUIPMENT

816

Coonce (VM), Levien (KL) and Torres (JA). **Mathematical models for drying rates and quality indicator changes during barley malt kilning.** *Cereal Foods World* 38(11); 1993; 822-826, 828-830

Aspects dealt in this article are modeling malt temp. changes during kiln drying, modeling malt drying rates during kilning, indicators of barley malt quality (proteases, β-glucanases, diastases, colour), simulation of enzyme deactivation during kilning, modeling malt colour formation during kilning, dynamic modeling of drying processes and recent modeling studies. CSA

817

Dural (NH) and Hines (AL). **A new theoretical isotherm equation for water vapour-food systems: Multilayer adsorption on heterogeneous surfaces.** *Journal of Food Engineering* 20(1); 1993; 75-96

A new analytical isotherm equation that can be applicable to water vapour-food systems is reported. The model describes the multilayer adsorption on energetically heterogeneous surfaces by assuming that the local isotherm for a specific site is given by the GAB isotherm, and the distribution of energetically different sites is represented by a generalized exponential function of the new isotherm tested. Results showed that the model provides an accurate and simple description of the adsorption characteristics for heterogeneous adsorbents. BV

818

Califano (AN) and Zaritzky (NE). **A numerical method for simulating heat transfer in heterogenous and irregularly shaped foodstuffs.** *Journal of Food Process Engineering* 16(3); 1993; 159-171

Heat conduction during cooking of foodstuffs with heterogenous thermal properties was simulated, mainly for irregularly shaped geometries. A code employing boundary-fitted grids was implemented in a numerically conservative form (control vol. formulation). This technique consists of finding a numerical coordinate transformation which fits a regular grid to the domain of integration. With the grid as data, coeff. for a transformed differential equation are then obtlaned. The proposed model was experimentally verified on irregularly shaped pieces of beef containing a non uniform distribution of fat. Relative errors between predicted and measured temp. were less than 2%. The effects of heat transfer coeff. and temp. of the cooking medium on the temp. distribution during the process were analyzed. The influence of different fat patterns was also considered. AA

819

Desobry () and Hardy (J). **Modelling of the total water desorption rate from packaged moist food.** *International Journal of Food Science and Technology* 28(4); 1993; 347-359

This study deals with the modelling of total water desorption rate (TWDR) from moist food in multilayer packaging. The TWDR detn. method is based on water content variations of an open or wrapped agar gel simulating high moisture content food (Camembert cheese). The packaging studied, widely used in the French cheese industry, is composed of 3 interacting layers (wax, paper, varnish). First, a simple paper was studied with diferent quantity of wax (0-6 gm^{-2}). Then, various quantities of varnish (from 0-45 gm^{-2}) were layered on the waxed paper. The interactions between all the packaging components and their effects on TWDR are shown and explained. The method allows calculation of the apparent water diffusivities, the water concn. and the a_w at each point in the packaging from Fick's and Henry's laws and water sorption isotherms. A model of water vapour transport from the centre of a moist food to atm. through the wrapping materials is proposed and validated. AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

820

Bellion (IR) and Wedzicha (BL). **Effect of glycerol on the kinetics of the glucose-glycine-sulphite reaction.** *Food Chemistry* 47(3); 1993; 285-288

The kinetics of loss of sulphite species, S(IV), from mixtures of glucose, glycine and S(IV) were measured in aqueous sol. containing varying amounts of glycerol in the range 0-81.5% (w/w) corresponding to a_w, in the range 1.0-0.45. The data are used to obtain rate constants for the S(IV)-independent and S(IV)-dependent reactions leading to the formation of 3-deoxyhexosulose in the early stages of the glucose-glycine reaction. The effects of a_w on values of these rate constants are discussed. AA

821

Sahbaz (F) and Somer (G). **The effect of citrate anions on the kinetics of cupric ion-catalysed oxidation of ascorbic acid.** *Food Chemistry* 47(4); 1993; 345-349

At 25°C, with 2.5 - 6.0 pH range, the rate of cupric ion-catalysed oxidation was of the first order with respect to ascorbic acid. The observed effects of pH and cupric ion concn. on the reaction rate indicate the formation of a transition complex between monoascorbate ion and Cu(II)-citrate. The catalytic ability order was $Cu(II) > H_3CiCu^+ > 7HCiCU^- > CiCu^{-2}$. Hydrogen peroxide was also detected during the reaction. SD

822

Mathews (S), Singhal (RS) and Kulkarni (PR). **Some physicochemical characteristics of *Lepidium sativum* (haliv) seeds.** *Die Nahrung* 37(1); 1993; 69-71

The physical characteristics, proximate analysis, carbohydrate profile, swelling index and water holding capacity of *L. sativum* seeds commonly known as haliv, used traditionally in India in the diet of lactating women in the post-natal period is reported. AA

823

Acosta Artiles (A), Diaz Romero (C) and Hardisson De La Torre (A). **Concentration levels of metals in different types of vinegars.** *Die Nahrung* 37(1); 1993; 72-73

824

Lii (CY) and Lee (BL). **Heating A-, B-, and C-type starches in aqueous sodium chloride: Effects of sodium chloride concentration and moisture content on differential scanning calorimetry thermograms.** *Cereal Chemistry* 70(2); 1993; 188-192

The effects of moisture and NaCl content on the phase transitions of different granular starches were examined by differential scanning calorimetry. Samples were adjusted to starch-water wt. ratios of 1:4, 2:3 and 3:2 in NaCl concn. of 0, 1, 2, 3, 4, 5 M. The gelatinization temp. (GTs) of 7 starches increased and then decreased as the NaCl concn. increased. However, the salt effects on starches of different X-ray diffraction patterns varied because of their different granular structures. The GTs of the B-starches with salt decreased to a level lower than that of the individual original starch, whereas the GTs of A-starches were always higher than those of their respective native samples. The increment of GT in the A-starch was also greater than that in the B-starch. The influence of NaCl on lotus tuber starch (C-starch) was a combination of the modes of A- and B-starches. The amylose content of starch did not affect the influence of NaCl or gelatinization. NaCl created similar effects on the endotherms in excess water content and on the first endotherm with limited water content. AA

825

Paik (JS) and Tigani (MA). **Application of regular solution theory in predicting equilibrium sorption of flavour compounds by packaging polymers.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 806-808

Equilibrium sorption values of model flavour compounds and polymers used in packaging were determined by immersing polymer samples in liquid flavour compounds. The equilibrium sorption values were normalized for crystallinity and concn. differences. The plot of ln S vs the squared difference between the solubility parameter of polymer and solvents $(\delta_1 - \delta_2)^2$ resulted in poor correlation. This seems to indicate that modifications are required in applying the Hildebrand-Scatchard concept of sol. for the prediction of flavour sorption by polymer packaging materials. Results indicate that the consideration of polymer chain configurations and more reliable δ values for polymers may improve the prediction. AA

Chemistry(Analytical)

826

Lin (JCC), Nagy (S) and Klim (M). **Application of pattern recognition technique to sensory and gas chromatographic flavour profiles of natural orange aroma.** *Food Chemistry* 47(3); 1993; 235-245

A trained panel evaluated 12 aroma descriptors and overall quality on a 7 point quantitative descriptive analysis (QDA) and separated samples into 6 categories as fruits, fresh-orange-like, flowery herbal-like, butter oil-like, pepper-like and fruity tea-like. Aroma constituents (32 peaks) were identified and quantified by GCMS. QDA and GC data were analysed for pattern recognition routines of ARTHUR and the category data by non-linear mapping (NLM). Feature weightings (variance and Fisher) indicated that 'overall quality' as the most discriminating power for sensory evaluation of good quality aroma. The GC data clearly separated aroma samples into groupings that were related to the categories previously separated by aroma panel and depicted by NLM. Ethyl acetate, acetal and ethyl butyrate featured high variance and Fisher weightage. SD

827

Scott (KJ) and Hart (DJ). **Further observations on problems associated with the analysis of carotenoids by HPLC-2.** *Food Chemistry* 47(4); 1993; 403-405

The chromatographic system to separate lutein, zeaxanthin, β-cryptoxanthin, lycopene and α- and β-carotene in which the analytical variation caused by column temp. on the elution time and elution profile was reduced by temp. control viz 20 - 22.5°C as optimum. SD

828

Kim (N), Kwon (DY), Hong (HD), Mok (C), Kim (YJ), Nam (YJ). **HPLC analysis of a back bone compound,**
β-benzyl-N-carbobenzoxy-L-aspartyl-D-alanine, of intense peptide sweetners belonging to L-aspartyl-D-alanine amides. *Food Chemistry* 47(4); 1993; 407-410

The most effective eluent composition and flow rate for HPLC assay were CH_3CN:0.2 M triethylamine-$H_3PO_4(PH_3)$ in 1:1 ratio and 0.8 ml/min respectively. The optimum reaction time between silylated D-alanine and mixed anhydride in the synthesis of the backbone compound was 80 min. The method is simple, reliable, excellently reproducible and gives favourable recovery of the backbone compound of high purity standard. SD

829

Thompson (LJ), Densiton (DJ) and Hoyer (CW). **Method for evaluating package - related flavours.** *Food Technology* 48(1); 1994; 90-94

Investigation undertaken to develop an uncomplicated method of package evaluation that would describe the aroma and flavour characteristics as well as the intensity is dealt in this article. Comparison of the results among the resin manufactures, converters and processors and a scale calibrated to reference standards developed is also described. CSA

830

Sattar (A), Ahmad (N) and Khan (LA). **Potentiometric stripping analysis of selected heavy metals in biological materials.** *Die Nahrung* 37(3); 1993; 220-225

Different biological materials (BM) (edible oils, refined and unrefined cane and beet sugar and tea (black and green) leaves) were assayed for the heavy metals (Cd, Cu, Pb and Zn). The results revealed significant differences in heavy metal (HM) contents within each class of the BM ($P < 0.05$). Cd was not detectable in sugar samples. Among the oils, highest amounts of Cu (0.263 μg/g) and Pb (0.154 μg/g) were in corn oil and Zn in olive oil (3.01 μg/g) whereas Cd exhibited a narrow range (0.023 - 0.033 μg/g). The samples ofbeet-sugar generally contained higher levels of HM than cane-sugar. Black and green tea leaves contained 0.411 - 0.908 μg Cd/g, 6.500 - 9.220 μg Cu/g, 2.200 - 5.238 μg Pb/g, and 14.500 - 25.180 μg Zn/g. BV

831

McCluskey (S) and Devery (R). **Validation of chromatographic analysis of cholesterol oxides in dried foods.** *Trends in Food Science and Technology* 4(6); 1993; 175-178

This review addresses the criteria necessary for full validation of chromatographic methods used in cholesterol oxide analysis. Aspects covered are analysis of cholesterol oxidation products (COPs), criteria for the validation of chromatographic assay, validation procedures (specificity, precision, accuracy, linearity, robustness, recovery) and common pitfalls in the analysis of COPs. 14 references. BV

832

Sundfeld (E), Yun (S), Krochta (JM) and Richardson (T). **Separation of cholesterol from butteroil using quillaja saponins. 1. Effects of pH, contact time and adsorbent.** *Journal of Food Process Engineering* 16(3); 1993; 191-205

833

Sunfeld (E), Krochta (JM) and Richardson (T). **Separation of cholesterol from butteroil using quillaja saponins. II. Effects of temperature, agitation and concentration of quillaja solution.** *Journal of Food Process Engineering* 16(3); 1993; 207-226

The processes and controls studied (1) W, (2) R, (3) A, (4) R+A, (5) R+W. The last step in all the processes and controls was the separation of fat phase, after which analyses were made. ANOVA indicated that the adsorption control process did not yield any significant cholesterol reduction over the water control. All other processes resulted in significant cholesterol separation in the order R+A > R+W > R. The levels of cholesterol reduction achieved by the R, R+W and R+A processes were significantly affected by concn. of quillaja sol. and temp.; the level of agitation had no significant effect over the range investigated. Quillaja powder residue was present in the fat phase after reaction (2) but both adsorption and washing procedures significantly reduced it. RN

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

834

Sajilata (M), Nayak (RR), Singhal (RS) and Kulkarni (PR). **Microorganisms as indices of food quality.** *Beverage and Food World* 21(2); 1994; 9-11

Indices of different food classes such as water, blanched vegetables, meat and poultry products, dairy products, fluid milk, raw and pasteurised, concentrated and dry milk products, butter, cheese and other fermented dairy products, ice cream and related products, fish and shell-fish are described in the article. SRA

835

Xavier (IJ) and Ingham (S). **Increased D-values for *Salmonella enteritidis* resulting from the use of anaerobic enumeration methods.** *Food Microbiology* 10(3); 1993; 223-228

D-value (decimal reduction time) was determined for *Sal. enteritidis* ATCC 4931 at 52, 54, 56 and 58°C in skim milk and casein peptone soymeal peptone broth supplemented with 0.6% yeast extract (CASO-YE). Four combinations of heating conditions and survivor enumeration method were tested for each medium: (1) pre-reduced heating medium with anaerobic enumeration (PAn); (2) non-reduced heating medium with anaerobic enumeration (NAn); (3) non-reduced heating medium with a fluid thioglycollate overlay enumeration method (NOverlay); (4) non-reduced medium with aerobic enumeration (NAer). The D-values obtained using PAn, Nan, and NOverlay were significantly ($P < 0.05$) greater than those obtained using NAer for both CASO-YE and skim milk at each of the temp. tested. For a given temp., the differences in D-values between the first 3 methods were usually not significant. Anaerobic enumeration methods may be important in evaluating the microbiological safety of lightly heated foods packaged under low-oxygen conditions. AA

836

EHEDG. **A method for the assessment of bacteria tightness of food processing equipment.** *Trends in Food Science and Technology* 4(6); 1993; 190-192

The procedure for assessing the bacteria tightness of food-processing equipment recommended by the Test Methods subgroups of the EHEDG are summarised. BV

Fungi

837

Ros (JM), Saura (D), Salmeron (MC) and Laencina (J). **On the response under different thermal treatments of the thermostable endopolygalacturonase produced by *Rhizopus nigricans*.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 356-359

The influence of temp. and thermal treatments on the endopolygalacturonase activity produced by *R. nigrocans* was studied. The optimum temp. was at 50°C. The enzymatic preparation also showed the highest endo pattern at this temp. This endopolygalacturonase showed high thermostability between 90-100°C and a bimodal behaviour in relation to the thermal treatments, because the enzyme was strongly inactivated at 70°C. When the enzyme was treated at 90°C and 70°C consecutively, the inactivation at 70°C was smaller. AA

Aspergillus flavus

838

Ellis (WO), Smith (JP), Simpson (BK) and Ramaswamy (H). **Effect of inoculum level on aflatoxin production by *Aspergillus flavus* under modified atmosphere packaging (MAP) conditions.** *Food Microbiology* 10(6); 1993; 525-535

Regression analysis of the data showed that inoculum level, a_w, storage temp. and head space O_2 has a significant effect on both growth and production of aflatoxin by *Asp. flavus*. Max. growth of 4.17 mg g^{-1} occurred at an inoculum level of 10^4 spores/plate, an a_w of 0.95, storage temp. of 20°C and 15% headspace O_2. Max. aflatoxin level of 3.45 μg^{-1} occurred at 10^3 inoculum level/plate, 0.96 a_w, storage temp. of 25°C and 10% O_2 level. Packaging under completely anaerobic conditions using Ageless O_2 absorbents inhibited both growth and production of aflatoxin by *Asp. flavus*, irrespective of the inoculum levels and storage temp. used. SRA

Mushrooms

839

Fasidi (IO) and Kadiri (M). **Effect of sporophore maturity on chemical composition of *Volvariella esculenta* (mass) singer, a Nigerian mushroom.** *Die Nahrung* 37(3); 1993; 269-273

The "egg", "elongated" and "mature" stages of *Vol. esculenta* (Mass) SINGER sporocarps were analysed for their chemical composition. The "egg' stage was found to contain the highest amount of nutrients and the "elongated" stage the lowest. The "egg" stage was rich in protein, amino acids, lipid, crude fibres, glycogen, sugars, K, Mg, Ca and P than the "elongated" and "mature" sporocarp stages. At any sporocarp stage, the pileus contained higher amounts of moisture, sugars, ash, lipid, protein, amino acid, P, Fe, Cu and Zn than the stipe while the stipe contained more dry matter, crude fibre, Ca and Mg. BV

840

Papaparaskeva-Petrides (C), Ioannides (C) and Walker (R). **Contribution of phenolic and quinonoid structures in the mutagenicity of the edible mushroom *Agaricus bisporus*.** *Food and Chemical Toxicology* 31(8); 1993; 561-567

The objectives of this work were to establish the contribution of agaritine in the mutagenicity of ethanolic extracts from *Agaricus bisporus* and to examine the possible involvement of phenolic and quinonoid compounds in the mutagenic response to mushrooms. The mutagenic profile of agaritine in the Ames test, in the absence of an activation system, was different from that of the mushroom ethanolic extracts. Incorporation of rat hepatic cytosolic fractions as the activation system increased the mutagenicity of the mushroom ethanolic extracts in *Salmonella typhimurium* strain TA 104 but did not influence the mutagenicity of agaritine. It was concluded that agaritine is not the principal mutagenic component in the mushroom. The cytosol-induced mutagenicity of the mushroom extracts required NADPH, and was inhibited by dicoumarol and menadione. Moreover, the mutagenic response in the presence of cytosolic fractions was inhibited by superoxide dimutase, catalase, glutathione and dimethyl sulphoxide, thus implicating reactive oxygen species. Finally, tyrosine, the enzyme converting mushroom phenols to quinones, increased the mutagenicity of the mushroom extracts. Collectively, the above results indicate that phenolic and quinonoid compounds, presumably through the generation of reactive oxygen species, may play a significant role in the mutagenicity of mushroom extracts. AA

Yeasts

Saccharomyces cerevisiae

841

King (VA-E). **Studies on the control of the growth of *Saccharomyces cerevisiae* by using response surface methodology to achieve effective preservation at high water activities.** *International Journal of Food Science and Technology* 28(5); 1993; 519-529

Water activity (0.93 - 0.97), pH (4 - 6), sorbic acid concn. (0 - 50 p.p.m.) were combined to study their effects on the growth of *Saccharomyces cerevisiae*. A 3-variable and 3-level design method, analysed by response surface methodology (RSM), was used. These factors were found to be significantly effective on the reciprocal of lag time, the growth rate, and the max. population of the yeast grown in lab. media. Fitted polynomial regression equations were plotted using a graphing software package. Inhibitory conditions of these 3 variables to the growth were determined based on these graphs. Results showed that *S. cerevisiae* could be inhibited at a_w 0.94 and pH 4 with sorbic acid concn. of 25 p.p.m. The predicted conditions of inhibition and the experimental values were consistent. This verified the adequacy of these predicted models. RSM was found to be appropriate for the study of food microbial growth only if the selection of the region of operating conditions was adequate. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

842

Spillane (WJ), Sheahan (MB) and Ryder (CA). **Synthesis and taste properties of sodium disubstituted phenylsulfamates. Structure-taste relationship for sweet and bitter/sweet sulfamates.** *Food Chemistry* 47(4); 1993; 363-369

Forty ring disubstituted phenylsulfamate have been synthesized as their Na salts. These compounds display a var. of tastes including sweet, bitter and sour. Seven of them gave a predominantly sweet taste, 12 displayed a bitter taste followed by a sweet aftertaste, 11 showed predominant bitterness, 5 sourness and 5 gave and aniline- or hydrocarbon-like taste and were not assessed further by the panellists. A plot of z (width of molecule, measured using Corey-Pualing-Koltun (CPK) models) vs first-order molecular connectivity, ${}^1x^v$ placed the seven predominantly sweet compounds on the line described by $z = 2.27\ {}^1x^v - 0.158$. Summation of Hammett sigma (σ) values for the X and Y substituents gives $\Sigma\ \sigma$, and with these the following structure-taste relationships were derived. Predominant sweetness: $\Sigma{:}\sigma$ greater than or equal to 0.6, V_{CPK} less than or equal to 300 A^3 and a meta-electron with drawing substituent, no *para*-substituent. Bitter/sweet aftertaste: $\Sigma\ \sigma$ less than or equal to 0.22, V_{CPK} less than or equal to 300 A^3. Some of the starting disubstituted anilines have been reported to be sweet and sulfamation modifies or destroys this sweetness. This is also discussed. AA

Colorants

843

Thakur (BR) and Arya (SS). **Stability of sunset yellow FCF and tartrazine in liquid model food systems.** *Die Nahrung* 37(1); 1993; 15-19

Effect of various preservatives, sugar, ascorbic acid and light on the stability of sunset yellow and tartrazine was studied. While SO_2 enhanced the rate of degradation of sunset yellow, it stabilized tartrazine in aqueous model systems. At 30 and 45 % sugar levels, the rate of degradation of both sunset yellow and tartrazine was practically same in the presence of benzoic acid and sorbic acid. At 15% sugar level, the rate of degradation of tartrazine was slightly higher in the presence of sorbic acid. Incorporation of ascorbic acid enhanced the degradation of both sunset yellow and tartrazine and its effect was considerably higher in the presence of light. Increase in sugar concn. enhanced the stability of both the dyes, but light enhanced their degradation. AA

Emulsifiers

844

Eydt (AJ). **Formulating reduced-fat foods with polyglycerol ester emulsifiers.** *Food Technology* 48(1); 1994; 82-83, 140

The article describes the properties and benefits of polyglycerol esters and focusses on a study demonstrating the advantages of the ingredient in reduced-fat creamy bakery fillings. CSA

CEREALS

845

Pokorny (J), Voldrichova (I), Kminek (M), Palatova (M) and Holas (J). **Water adsorption on extruded cereal products.** *Die Nahrung* 37(1); 1993; 82-84

846

Ranhotra (GS), Gelroth (JA) and Eisenbraun (GJ). **Correlation between chopin and AACC methods of determining damaged starch.** *Cereal Chemistry* 70(2); 1993; 236-237

Damaged starch (DS) values were determined in 58 commercially produced patent flours by the enzymatic lab. method (AACC), for all flours, averaged 7.5%; those obtained by the Chopin method (rapid iodometric method using the recently introduced Chopin SD4 instrument) averaged 5.6%. The correlation value was 0.90. For the Chopin method, recalibration of the instrument to flours with known DS levels may be necessary to improve agreement between the 2 methods of determining DS. BV

847

Loewe (R). **Role of ingredients in batter systems.** *Cereal Foods World* 38(9); 1993; 673-677

Highlights the processing considerations and quality factors in batter-coated products, discusses the general roles of individual ingredients (shortening and oil, egg and milk products, gums, starches, flavourings and seasonings) and the importance of their interactions in batter system. CSA

848

Moskowitz (HR). **Consumer-designed concepts for cereals.** *Cereal Foods World* 38(11); 1993; 811-816

Traditional methods of concept development and testing and concept optimization via conjoint measurement is discussed. A case history of ready-to-eat cereal for development of consumer-designed concepts involving various steps such as elements, restrictions, experimental design, consumer evaluations, building the model, segmenting consumers, identification of successful elements and creating new concepts is explained in this article. CSA

849

Dural (NH) and Hines (AL). **Adsorption of water on cereal-bread type dietary fibers.** *Journal of Food Engineering* 20(1); 1993; 17-43

A study involving the water sorption characteristics of cereal-bread type food fibers was conducted, using a gravimetrical adsorption apparatus. Water adsorption data for 4 dietary fibers (DF), corn bran, wheat bran, oat fiber and rice fiber, were measured at 278, 288, 298 and 310 K. The results showed that the adsorption of water vapour on these fibres are primarily due to physical forces, and all fibres investigated exhibited energetically heterogeneous surfaces. It was found that the distribution of the major components of the DF has an impact on the fiber's water sorption capacity. The isotherm data were correlated by using the BET and GAB multilayer adsorption models. The BET equation gave accurate correlations for up to 35 to 40% of the saturation pressure, while the GAB equation provided much better correlation of the data for the higher relative pressures. AA

850

Ferrero (C), Martino (MN) and Zaritzky (NE). **Effect of freezing rate and xanthan gum on the properties of corn starch and wheat flour pastes.** *International Journal of Food Science and Technology* 28(5); 1993; 481-498

The effects of freezing rate on exudate production, rheological behaviour, ice crystal size, and starch retrogradation of corn starch and wheat flour pastes (10% w/w) with and without xanthan gum (0.3% w/w) were studied by means of capillary suction, rotational viscometry, indirect microscopy, and differential scanning calorimetry (DSC). Higher freezing rates preserved textural characteristics and produced less exudate. In corn starch pastes, rates < 1 mm h^{-1} caused a marked spongy structure, undesirable for a sauce-like product, but only a slightly spongy structure in wheat flour pastes. Xanthan gum addition maintained the smoothness characteristic of the unfrozen pastes, avoiding amylose retrogradation. However, effects on ice crystal formation and amylopectin retrogradation were not observed. Although high freezing rates are mostly recommended, low levels of xanthan gum maintained quality characteristics even at low freezing rates, decreasing equipment cost. AA

Buckwheat

851

Amarowicz (R), Okubo (K) and Kmita-Glazewska (H). **Adsorption of bile salts by buckwheat fibre.** *Die Nahrung* 37(1); 1993; 66-68

Rice

852

Marshall (WE), Wadsworth (JI), Verma (LR) and Velupillai (L). **Determining the degree of gelatinization in parboiled rice: Comparison of a subjective and an objective method.** *Cereal Chemistry* 70(2); 1994; 226-230

Lemont and Tebonnet long-grain rice samples were parboiled either conventionally or by microwave to different degrees of starch gelatinization. The degree of gelatinization was determined by an objective method (differential scanning calorimetry) and by a subjective rice-grading method that yielded the % of translucent kernels in a given sample of parboiled rice. A linear correlation was found between the 2 methods for both var., which suggested that the grading procedure could be used to estimate the degree of gelatinization once a calibration curve was established. In addition, the degree of gelatinization, as determined by differential scanning calorimetry, was compared with head rice yield. The relationship between the 2 variables was nonlinear, and max. head rice yield for both Lemont and Tebonnet was achieved when the starch was about 40% gelatinized. The results indicate that extensive starch gelatinization (extensive parboiling) is not necessary to obtain max. head rice yields. AA

853

Sarkar (RK), Nanda (BB), Dash (AB) and Lodh (SB). **Grain characteristics and cooking quality of aromatic and non-aromatic, long and slender varieties of rice (*Oryza sativa*).** *Indian Journal of Agricultural Sciences* 64(5); 1994; 305-309

12 long and slender rices (*O. sativa* L.) including 9 aromatic and 3 non-aromatic were studied to identity superior genotypes with high recovery of head rice. High density grain % showed recovery of head rice. High density grain % showed significant positive association with 1000-grain wt., hulling, milling and head rice recovery. Basmati 385 and Gaurav among the scented var. and Hatipanjari among the non-scented var. were superior to others based on the physical appearance, amylose content, alkali value, gel consistency and cooking quality (water uptake, kernel length and breadth after cooking and vol. expansion) and these could be used as donors in rice breeding programme for improving quality. KAR

Rice bran

854

Takano (K). **Mechanism of lipid hydrolysis in rice bran.** *Cereal Foods World* 38(9); 1993; 695-698

The article attempts to clarify the decomposition mechanism of rice bran lipids and explains the findings. Aspects covered are the changes in lipids in rice bran, lipid decomposing enzymes (lipases, phospholipases) in rice bran, properties of rice bran spherosomes, disintegration of spherosome and lipid decomposition. CSA

Ryes

Rye flour

855

Wannerberger (L) and Eliasson (A-C). **Differential scanning calorimetry studies on rye flour-milling streams.** *Cereal Chemistry* 70(2); 1993; 196-198

The thermal behaviour of rye flour-milling streams was studied with differential scanning calorimetry. The differential scanning calorimetry-thermogram of the flour stream with the lowest levels of proteins and damaged starch showed a double endotherm and was very similar to that found for the gelatinization of starch at the actual water content. The thermogram of the flour with the highest protein content and the highest amount of damaged starch was quite different and showed one broad symmetric endotherm. It could be concluded that the milling process affects the interaction between the crystalline regions and the amorphous parts in the starch granules. The results showed that an increase in gelatinization onset temp. (T_o) and peak max. (T_m) occurred with an increased level of damaged starch. This was related to a change from a double to a single endotherm. Both T_o and T_m increased with an increased level of protein. The gelatinization enthalpy (ΔH) increased with an increased level of starch damage and with increasing protein content, but the differences in ΔH between milling streams were small. AA

856

Olama (ZA), Hamza (MA), El-Sayed (MM) and Abdel-Fattah (M). **Purification, properties and factors affecting the activity of *Trichoderma viride* cellulase.** *Food Chemistry* 47(3); 1993; 221-226

Cellulases produced by *Trichoderma viride* grown on wheat bran were fractionated by ammonium sulphate (50%) and purified by chromatography on DEAE-Sephadex A50 followed by CM-Sephadex C50. The overall purification method showed a protein reduction of 99.8% of the original protein content of the culture filtrate. On the other hand the specific activity was increased about 228-fold. Amino acid analysis of the purified enzyme showed that glycine was the predominant one followed by glutamic acid, serine, alanine and leucine. Cysteine and tyrosine were the least common amino acids. Electrophoresis by Disc-PAGE showed that the purified enzyme was homogenous since it gave only one distinctive band. The enzyme had a MW of 58000 as indicated by SDS-PAGE. The isoelectric point of the enzyme was 5.7. The cellulolytic activity was directly proportional to the enzyme concn. and was substrate-dependent. The max. enzyme activity was found at pH 5 when incubated at 45°C for 30 min. AA

857

Clawson (AR) and Taylor (AJ). **Chemical changes during cooking of wheat.** *Food Chemistry* 47(4); 1993; 337-343

Maillard reaction occurred when wheat was heated as evidenced by decrease in reducing sugars, amino acids and production of water and indicated no direct link between Maillard reaction or production of water and colour development. Large number of reactions and interactions occurred with ground wheat, making it extremely difficult to determine the Maillard reaction. SD

858

Lim (S) and Seib (PA). **Preparation and pasting properties of wheat and corn starch phosphates.** *Cereal Chemistry* 70(2); 1993; 137-144

Wheat and corn starches were phosphorylated in a semidry state at 130°C with 5% (based on dry starch) sodium tripolyphosphate (STPP) and/or 2% sodium trimetaphosphate (STMP). All phosphorylation reactions were done using 5% sodium sulphate and adjusting the initial reaction pH by adding aqueous NaOH or HCl to the prereaction slurries. As reaction pH was increased from 6 to 11, the degree of phosphorylation decreased 40-50% with STPP, whereas it increased 100% with STMP. At an initial reaction pH of 10 with STPP, a wheat starch phosphate was obtained with 0.22% P (including 0.05% P from phospholipids), and its pasting properties showed optimum thickening power with shear stability when cooked at 95°C. The best corn starch phosphate, judging from its paste properties, was obtained at an initial pH of 11 and STPP and contained 0.16% P (including 0.02% from lipid). When corn or wheat starch was heated with a mixture of 5% STPP and 2% STMP, the best product when pasted at 95°C was obtained at the initial reaction pH of 9.5. Paste clarity of the phosphorylated starches indicated that cross-linking accelerated rapidly above pH 8 with STMP but above pH 10 with STPP. AA

859

Lim (S) and Seib (PA). **Location of phosphate esters in a wheat starch phosphate by ^{31}P-nuclear magnetic resonance spectroscopy.** *Cereal Chemistry* 70(2); 1993; 145-152

Phosphate esters of D-glucose, methyl α-D-glucopyranoside, and maltose, as well as the α, γ-limit phosphodextrins from native potato starch (degree of substitution [DS] 0.0033) and phosphorylated amylose (DS 0.016) served as model compounds in ^{31}P-nuclear magnetic resonance experiments to locate the phosphate groups on a phosphorylated wheat starch (DS 0.012). The α, γ-limit phosphodextrins were isolated by ion-exchange chromatography after exhaustive digestion of amylose or starch phosphates with *Bacillus amyloliquifaciens* α-amylase followed by *Aspergillus niger* glucoamylase. The endogenous orthophosphate groups on potato starch were confirmed to be the 6- and 3-esters.

The wheat starch phosphate, prepared by heating starch with sodium tripolyphosphate under semidry conditions at an initial pH of 6, contained mainly 6-monophosphate esters along with lower levels of 3- and probably 2-monophosphates. The wheat starch phosphate contained orthophosphate groups at the nonreducing ends of starch molecules, whereas endogenous phosphate esters in potato starch occur on inner anhydroglucose units. AA

860

Rogers (DE), Hoseney (RC), Lookhart (GL), Curran (SP), Lin (WDA), Sears (RG). **Milling and cookie baking quality of near isogenic lines of wheat differing in kernel hardness.** *Cereal Chemistry* 70(2); 1993; 183-187

Two sets of near-isogenic lines of wheat were milled on a modified Barbender Quadrumat Senior experimental mill and were identified as being either hard or soft. Those identifications were made during milling. The resulting flours were tested for starch damage, presence of the 15-kDa starch granule protein, and sugar-snap cookie spread. The 19 lines derived from Falcon, 10 hard and 9 soft, had acid-polyacrylamide gel electrophoresis (A-PAGE) patterns of gliadins identical to each other and to those of Falcon. Likewise, the 11 lines derived from Heron, 6 hard and 5 soft, had A-PAGE patterns identical to each other and to those of Heron. As expected, the A-PAGE patterns were genotypic and not related to the hardness or softness characteristic. Milling and baking parameters correlated highly with classification of the flours as being hard or soft, rather than with classification according to the flour's gliadin (A-PAGE) pattern. AA

861

Shiiba (K), Yamada (H), Hara (H), Okada (K) and Nagao (S). **Purification and characterization of two arabinoxylans from wheat bran.** *Cereal Chemistry* 70(2); 1993; 209-214

In this study, water-soluble hemicellulose (WSH) was prepared in quantity from wheat bran by a new preparation method. Finally, to clarify not only their nutritive effect but their effect on rheological behaviour of doughs, arabinoxylans were purified from this WSH. They were characterized and their structure was investigated. BV

862

Kruger (JE) and Hatcher (DW). **A sensitive kinetic microassay for the determination of wheat α-amylase.** *Cereal Chemistry* 70(2); 1993; 234-235

This article describes a method using a kinetic microplate reader, which was assessed as a potential replacement. It is based on a principle similar to that of the modified AACC method 22-07 method but overcomes some of the limitations. Using this method, enzyme-catalysed rates of decreases in turbidity of β-limit dextrin substrate were found to be satisfactorily monitored simultaneously in 96-well microtiter plates. BV

863

Olewnik (M) and Kulp (K). **Factors influencing wheat flour performance in batter systems.** *Cereal Foods World* 38(9); 1993; 679-684

Factors [type of flour (soft or hard), protein levels in each type of flour, starch damage, supplementation of flours with amylolytic (cereal and fungal) and proteolytic enzymes, and the addition of oxidants (potassium bromate and iodate) and of reducing agents (L-cysteine and sodium bisulphite) affecting the performance characteristics of wheat flour is evaluated in flours, batters and fried coatings, and the results suggest some criteria that should be considered when selecting flours to be used in batter systems. CSA

864

Balint (L), Momirovic (J), Horvatic (M) and Vedrina (I). **Quantitative relations between farinogram area and new extensogram characteristics of wheat flour.** *Die Nahrung* 37(3); 1993; 234-240

In the analysis of farinograph curves, it has been determined that the farinograph area is a very reliable indicator of the quality of wheat flour, if it has been measured 12 min from the achievement of the max. In such a way, the dough development time, which can considerably influence the size of the farinograph curve, if it has been measured 15 min after the farinograph has been set in motion, has been eliminated. Quantitative relations between one of the most important characteristics of the farinogram - the farinogram area, and the determined dough characteristics related to dough quality which can be registered by means of the extensogram, have been determined: $A_{far} = k' E^2/A$, where A_{far} = farinogram area measured 12 min from the achievement of the max., E = dough extensibility, A = area of the extensogram, k' = represents the farinographic area when the ratio unit value is E^2A, k' = 4.18 and standard deviation s = 0.214. This determined relation gives a new approach to the farinograph curve interpretation and stresses the new importance of the farinograph as an instrument for physical testing of wheat flour quality. AA

865

Arun Kumar (GC). **Treatment of screenings.** *Indian Miller* 24(5); 1994; 23-27

This article suggests various means to increase the profitability of the operations; viz treating screenings of wheat on day to day basis; taking major portion of screening directly for treatment to save labour, reduction of storage area for total screening to minimise cross infestation, and mixing the screening with bran. SD

866

Wang (S), Casulli (J) and Bouvier (JM). **Effect of dough ingredients on apparent viscosity and properties of extrudates in twin-screw extrusion-cooking.** *International Journal of Food Science and Technology* 28(5); 1993; 465-479

A capillary-type viscometer was used in a twin-screw extruder to measure the apparent viscosity of cooked-extruded wheat-flour dough with various ingredients: lecithin, palm oil, sucrose, whey, NaCl and bran. The effects of concn. of these ingredients on dough rheology and physical properties of extrudates (apparent density, expansion ratios, mechanical, and crispness properties) were measured. The role of ingredients was discussed in terms of their physico-chemical effect on biopolymer conversion. The correlations between apparent viscosity of dough and physical properties of extrudates were developed. AA

Wheat starch

867

Bechtel (DB), Zayas (I), Dempster (R) and Wilson (JD). **Size-distribution of starch granules isolated from hard red winter and soft red winter wheats.** *Cereal Chemistry* 70(2); 1993; 238-239

MILLETS

Corn

868

Mannheim (A) and Cheryan (M). **Water-soluble zein by enzymatic modification in organic solvents.** *Cereal Chemistry* 70(2); 1993; 115-121

Water-soluble zein was produced using a dual-phase, sequential enzymatic modification and ultrafiltration. Zein was first partially hydrolyzed in an organic solvent by a protease, followed by an aqueous phase hydrolysis with the same protease. Ultrafiltration of the reaction mixture with a 10,000 and/or a 30,000 mol. wt. cut-off membrane yielded fractions with an av. of 5,400 Da. A significant improvement in certain functional properties of zein was observed, controlled largely by the degree of hydrolysis (DH). Solubility increased from 0% for the unmodified zein to 99% for enzyme modified (EM) and ultrafiltered zein. At less than DH20, solubility was also a function of pH and membrane pore size. Foaming properties were affected by DH, membrane pore size, and pH of measurement. At a a_w of 0.97, moisture sorption was 2.6 g of water/g of solids for the EM and ultrafiltered hydrolysates, compared to < 0.25 g of water/g of solids for unmodified zein. AA

869

Karahadian (C) and Jhonson (KA). **Analysis of headspace volatiles and sensory characteristics of fresh corn tortillas made**

from fresh masa dough and spray-dried masa flour. *Journal of Agricultural and Food Chemistry* 41(5); 1993; 791-799

Headspace volatiles from nitrogen-purged slurries of commercially prepared fresh tortillas, fresh masa dough, and spray-dried masa flour dough were collected onto Tenax GC. Ether-eluted concentrates were separated by fused silica capillary GC and identified by MS, retention indices (I_E), and odour quality of eluting peaks. Six pyrazines that contribute to the roasted, nutty and green character of cooked corn products were detected in fresh masa dough, whereas 12 pyrazines were identified in dough made from spray-dried masa flour. 2-Acetyl-1-pyrroline and 2-(methylimino)-3-butanone, which contributed popcorn-like and corn chip-like aromas respectively, were tentatively identified in spray-dried-products. Descriptive sensory analysis of commercially prepared tortillas from fresh masa dough and spray-dried masa flour indicated that tortillas made from spray-dried flours exhibited stronger roasted, cooked corn flavours and aromas. AA

Corn starch

870

Rodis (P), Wen (L-F) and Wasserman (BP). **Assessment of extrusion-induced starch fragmentation by gel-permeation chromatography and methylation analysis.** *Cereal Chemistry* 70(2); 1993; 152-157

Three commercial corn starches (high-amylose, amylopectin-enriched, and corn meal) were extruded under various conditions and analyzed for changes in solubility, mol. size distribution, and linkage content. Each of the extruded starches dissolved in dimethyl sulfoxide at a faster rate than unprocessed material. Gel-permeation chromatography confirmed the occurrence of starch fragmentation. Methylation analysis showed only small changes in linkage distributions, suggesting that under the conditions tested, the total number of fragmentation points is small relative to the total number of glycosidic linkages in starch. Furthermore, the absence of glucose or maltodextrins indicates that fragmentation sites are largely internal, rather than adjacent to the reducing or nonreducing termini of the amylopectin molecule. AA

871

Gruchala (L) and Pomeranz (Y). **Enzyme-resistant starch: Studies using differential scanning calorimetry.** *Cereal Chemistry* 70(2); 1993; 163-170

Factors governing the formation of enzyme-resistant starch (RS) from high-amylose maize starch under lab. conditions were investigated. Those factors studied included sample size, gel dimensions, number of heating-cooling cycles, and cooling conditions. Cooling to about 20°C produced RS with higher enthalpies than cooling to 4°C or freezing at about -20°C. Freeze-drying was not superior to oven-drying. Heating of resuspended RS increased enthalpies. RS could be stored at -20°C odour-free for at least 8 months. A rancid odour developed within several wks of storage at room temp. Thermal characteristics of RS, as measured by differential scanning calorimetry (DSC), were sample-size-dependent. To determine the stability of RS, samples were preheated under conditions similar to those in baking bread: temp. of 100 and 200°C, both dry and with water. Preheating RS, especially with water, at 200°C resulted in a disintegration of the RS. No significant changes in DSC characteristics took place during preheating at 100°C. The presence of gluten or wheat starch in RS blends (as they might exist in bread) reduced measurable DSC enthalpies. AA

Pearl millets

872

Almeida-Dominguez (HD), Gomez (MH), Serna-Saldivar (SO), Waniska (RD), Rooney (LW), Lusas (EW). **Extrusion cooking of pearl millet for production of millet-cowpea weaning foods.** *Cereal Chemistry* 70(2); 1993; 214-219

Pearl millet was decorticated to yield 91%, milled into flour, and extruded at different moisture contents (12.5, 13.6, 15.0 and 16.3%). Porridges were prepared from extruded millet, press-dried cowpea, and sorghum malt. Although decortication of millet removed some pericarp and peripheral endosperm, the proximate compositions of millet and some of the essential amino acid content remained constant, whereas the *in vitro* protein digestibility increased. Increased radial expansion, water solubility, and cold paste viscosity was observed in extrudates prepared from decorticated millet under low moisture conditions. A lower degree of mol. dispersion in water at 85°C was observed in extrudates prepared under low-moisture conditions. Porridges prepared from extruded millet and press-dried cowpea had high nutritional quality with acceptable properties of weaning foods (e.g., an intermediate consistency, smooth texture, and pleasant colour and flavour). Treatment with sorghum malt allowed the preparation of more fluid products. AA

Sorghum

873

Babikir (EFE) and El Tinay (AH). **Effect of soaking in water or in sodium carbonate on tannin content and *in vitro* protein digestibility of sorghum cultivars.** *International Journal of Food Science and Technology* 28(4); 1993; 389-395

Investigation of 2 sorghum cvs showed that although the tannin content of untreated seeds were 3.1 and 0.6% for Karamaka and Mugud cvs, respectively, their *in vitro* protein digestibility (IVPD) is very similar (89 and 90% respectively). Extractable tannin content was markedly reduced by steeping whole seeds in water or Na_2CO_3 sol. and by incubating them for up to 24 h at 30°C or up to 20 min at 100°C. With both cvs, the percentage tannin extracted increases with time, temp. and Na_2CO_3 concn., with an increase in the percentage *in vitro* protein digestibility, but the degree of change differed between the two cvs studied. Conditions have been observed which combine a low energy-input, short-time treatment with high protein digestibility of the treated grain. AA

Sorghum starch

874

Young (R), Gomez (MH), McDonough (CM), Waniska (RD) and Rooney (LW). **Changes in sorghum starch during parboiling.** *Cereal Chemistry* 70(2); 1993; 179-183

Sorghum grains varying in grain hardness or endosperm texture (soft and intermediate) and starch composition (nonwaxy and waxy) were parboiled. Whole grain (one vol.) and water (3 vols.) were boiled, soaked for 12 h, and brought to boil again (boil-soak-boil process) or alternatively, soaked overnight and boiled for 10 min (soak-boil process). The grain was dried at room temp. and decorticated. Parboiled kernels were darker, denser, smaller, and harder than non-parboiled kernels. Parboiling decreased starch crystallinity and starch dispersion in hot water. Parboiled grain with soft endopserm texture contained less dispersible and soluble starch than parboiled grain with intermediate endosperm texture. The physical characteristics of the waxy cv. were changed after parboiling; however, starch solubility and crystallinity decreased only slightly. Pasting properties of waxy sorghum were not changed as dramatically by parboiling as were those of nonwaxy cvs. Apparently, the absence of amylose in waxy starch substantially decreased retrogradation of starch polymers. AA

PULSES

875

Sadhana Sharma and Ahmad Salahuddin. **Purification and some properties of *Phaseolus mungo* lectin.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 700-703

Phaseolus mungo lectin in pure form was isolated from seeds by affinity chromatography on a galactosyl Sepharose 6B column. The lectin contained 8.3% netural carbohydrate. It absorbed maximally near 278 nm, and the corresponding maxima in fluorescence excitation and emission spectra occurred, respectively, at 278 and 337 nm. Its elution profile from an analytical Sephadex G-150 column was consistent with a mol. wt. of 137 000 and a Stokes radius of 4.3 nm; the frictional ratio, f/f_0, of the lectin was calculated to be 1.26. The lectin moved as a single protein band of M_r 66 000in SDS-PAGE under both reducing and nonreducing conditions. The results suggested that the lectin is a dimer whose overall native conformation is nearly globular. From the effect of 10 saccharides on the hemagglutinating activity of lectin against trypsinized rabbit erythrocytes, it was concluded that the lectin was galactose/N-acetylgalactosamine-specific, having significantly reduced affinity for N-acetylgalactosamine. The lectin showed preference for α-glycoside and probably does not contain a hydrophobic binding site. AA

876

Funk (A), Weder (JKP) and Belitz (H-D). **Primary structures of proteinase inhibitors from *Phaseolus vulgaris* var. *nanus* (cv. Borlotto).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 343-350

The primary structures of two trypsin-chymotrypsin inhibitors from *Phaseolus vulgaris* var. *nanus* (bush bean, cv. Borlotto), PVI-3_2 and PVI-4, were derived from automated Edman degradation data, amino acid composition and manual Edman degradation results of enzymatic fragments and homology with other Bowman-Brik type proteinase inhibitors. The highest degrees of homology were observed between PVI-3_2 or PVI-4 and the trypsin-chymotrypsin inhibitors from lima beans (LBII, IV and IV', 86%), black eyed peas (BTCI, 81%), and in part, adzuki beans (ABI I, II and II', 74-77%). Similarly, the primary structure of the trypsin-elastase inhibitor from the same source, PVI-3_1, was deduced which showed highest homology with that of the trypsin-elastase inhibitor GBI II from garden beans (92%), followed by GBI II' from garden beans (86%) and C-II from soybeans (71%). In contrast, homology between PVI-3_2 and PVI-4 on the one hand and PVI-3_1 on the other was relatively low (61%). AA

Broad beans

877

Danilenko (AN), Dmitrochenko (EE), Braudo (EE), Bogomolov (AA) and Rozantsev (EG). **Restricted enzymatic hydrolysis of legumin of broad beans (*Vicia faba* L.) by trypsin in concentrated solutions. Control of hydrolysis process at the expense of change of enzyme-substrate ratio.** *Die Nahrung* 37(1); 1993; 46-52

Kinetics and mechanism of proteolysis of broad bean (*Vicia faba* L.) legumin by trypsin in concentrated sol. at different enzyme-substrate ratios ((E/S) = 1/40, 1/100, 1/200, 1/1000) were studied. By the method of HPLC it was established that during proteolysis process (E/S = 1/40) take place both protein content decrease in hydrolysate and change of its mol. mass (from 360 to 280 kD), which evidences for the mixed type of proteolysis, including cooperative and non-cooperative mechanisms. Decrease of E/S from 1/40 up to 1/100 - 1/1000 leads not only to unproportional drop in proteolysis rate, but also to decrease of the relative contribution of cooperative proteolysis which is, possibly, connected with the presence in protein molecule of at least two groups of attack sites, differentiating by their affinity with enzyme. Change of enzyme-substrate ratio is accompanied also by change of subunit composition of product of non-cooperative proteolysis ('modified protein') and also of temp. and enthalpy of its denaturation. AA

Chickpeas

878

Barron (JM) and Espinoza (A). **Fortification of maize tortilla with alkali-treated chickpea flour.** *International Journal of Food Science and Technology* 28(5); 1993; 505-511

Critical parameters for the preparation of alkali-treated chickpea (*Cicer arietinum* var. Surutato-77) flour were studied. The alkali-treated chickpea flour was used to fortify a commercial maize flour for tortilla preparation. Fortification levels were set at 5, 10, 15, 20 and 25% (by wt.). Tortillas prepared from the fortified flour blends, were evaluated for their nutritive value and sensory attributes. The alkali-treated chickpeas showed high % digestibility and reduced trypsin inhibitor activity. Fortified tortillas showed a significant increase in nutritive value with improved colour and texture when compared to the maize tortilla (control). AA

Cowpeas

879

Liu (K), Phillips (RD) and McWatters (KH). **Induced hard-to-cook state in cowpeas by freeze-thawing and calcium chloride soaking.** *Cereal Chemistry* 70(2); 1993; 193-195

Cowpeas stored at -18°C and ambient humidity (control) or 30°C and 64% RH (aged) for 12 months were hydrated before being subjected to freeze-thawing (FT) cycles, $CaCl_2$ soaking, or combination of these. The cowpeas were monitored for electrolyte leakage, a possible indicator of cell membrane damage, and for hard-to-cook (HTC) state, Results showed that electrolyte leakage depended on storage conditions and the number of FT cycles. HTC state depended on storage conditions and the number of FT cycles, and the application sequence of FT and Ca^{2+} soaking. For control cowpeas, FT slightly softened seed texture but greatly enhanced the hardening effect of Ca^{2+} soaking applied subsequently. For aged cowpeas exhibiting a certain degree of HTC state, the greatest inducement of hardness was observed with Ca^{2+} soaking alone. Other divalent cations exerted effects similar to those of Ca^{2+} but to a lesser extent. With respect to the number of FT cycles, there was a parallel relationship in control cowpeas between electrolyte leakage after FT and HTC state induced by subsequent Ca^{2+} soaking. This relationship was not observed in aged seeds because of initial high electrolyte leakage during hydration. Overall results suggest that one part of HTC inducement during cation soaking occurs through loss of cell membrane integrity that allows cations to bind intracellular components. AA

Faba beans

880

Schwenke (KD), Dudek (S), Mothes (R), Raab (B) and Seifert (A). **Physico-chemical and enzymatic studies on acetylated protein isolates from faba beans (*Vicia faba* L.).** *Die Nahrung* 37(3); 1993; 258-268

Selected physico-chemical properties of faba bean protein isolate before and after being acetylated have been investigated using analytical ultracentrifugation, SE- and RP-HPLC, viscometry and hydrophobicity measurements using fluorescence probe techniques. The time course of relative chymotryptic hydrolysis rates was followed by means of the TNBS method and RP-HPLC analysis. The extensive decrease of the 11 S and 7 S protein components of the isolate in favour of a low mol. wt. 2 S component after exhaustive acetylation is the proof of the dissociated state of the highly modified derivatives. Both the viscometric measurement and the study of proteolysis breakdown give arguments for a rather unfolded state both of the unmodified and the modified protein isolates. The course of relative chymotryptic hydrolysis rate points to a successive transition from a globular state into a more unfolded one depending on the degree of acetylation. Both the viscometeric data and the hydrophobicity measurements revealed a conformational transition at about 60% N-acetylation. This level of modification corresponds to that where a sharp increase of OH-acetylation takes place. AA

Lupins

881

Trugo (LC), Donangelo (CM), Daurte (YA) and Tavares (CL). **Phytic acid and selected mineral composition of seed from wild species and cultivated varieties of lupin.** *Food Chemistry* 47(4); 1993; 391-394

Mn varied in the range 61-327 mg/100g DM for Lupinus-albus; 1.5 - 38 mg/100g DM between other species; Ca 134-350; Fe 2.4 - 10.8; Zn 2.9 - 17.6; Cu 0.4 - 1.4 and phytate 0.4 - 1.2 g/100g DM with cvs of *L. albus* and *L. cosentinii* presenting the lowest values. Very low phytate : Zn and (phytate x Ca); Zn molar ratios were observed in wild *L. digitatus* (4.4 and 0.3) and *L. pilosis* P23030 (5.3 and 0.3) indicating excellent Zn bioavailability. Phytate : Ca molar ratios of all samples indicate similar or better bioavailability of Ca as compared to other legumes. SD

Peas

882

Bishnoi (S) and Khetarpaul (N). **Variability in physico-chemical properties and nutrient composition of different pea cultivars.** *Food Chemistry* 47(4); 1993; 371-373

High-yielding var. - Bonneville and Arkel, vegetable peas; HFP4 (aparna) and Rachna, field peas were studied. Density ranged from 1.27 - 1.30 g/ml in the cvs. Arkel showed higher hydration capacity, hydration index, swelling capacity and swelling index than field peas. Total carbohydrates were higher and ash, fat and crude fibre lower in field peas. Crude protein values were similar in Bonneville, Arkel and Rachna. Varietal differences in field peas showed no influence on the physico-chemical properties. SD

OILSEEDS AND NUTS

Gorgon nut

883

Jha (SN) and Prasad (S). **Physical and thermal properties of gorgon nut.** *Journal of Food Process Engineering* 16(3); 1993; 237-245

Bulk density, true density, angle or repose, coeff. of friction on metal surfaces, specific heat, thermal diffusivity and conductivity of gorgon nut (*Euryale ferox*) were determined using standard techniques for different sizes of nuts at moisture contents (MC) and temp. ranging from 15 to 60% (dry basis) and 25 to 55°C, respectively. The physical properties varied quadratically with MC. Specific heat increased with moisture and temp. but decreased with the size of the nut; whereas, the thermal diffusivity showed a reverse trend. Thermal conductivity increased with MC but did not follow any trend with temp. within the range of the study. The physical and thermal properties data at various MC and temp. were used to develop equations for different sizes of gorgon nuts. AA

Groundnuts

884

Jambunathan (R), Singh (AK), Gurtu (S) and Raghunath (K). **Amino acid composition, fatty acid composition and levels of protease inhibitors in seeds of wild *Arachis* species.** *Oleagineux* 48(10); 1993; 415-419

Seventeen germplasm accessions, representing 6 sections of genus *Arachis* and 2 groundnut cvs as controls, were grown in pots under uniform conditions at the ICRISAT. The 100-seed mass of wild species was lower than that of cultivated. The relative concn. of protein and essential amino acids in wild *Arachis* species in general fall within the range reported for cultivated groundnut. Oil content in wild accessions was relatively higher than that of cultivated groundnut. Linoleic acid and nutritionally undesirable saturated long chain fatty acids, such as behenic and lignoceric acids, were higher in wild species than in cultivated species. Trypsin and chymotrypsin inhibitors in wild species were higher than in cultivated groundnut. AA

885

Rouziere (A). **Industrial preparation of ready-to-use groundnut seeds: the experience of Senegal. II - Treatment, preservation and field performance.** *Oleagineux* 48(3); 1993; 139-154

Fungicide-insecticide treatment is a key stage in the industrial preparation of ready-to-use groundnut seeds. It ensures effective protection against parasites in stocks and diseases on emergence, thereby providing a double guarantee of a successful outcome of the procedure. However, proceeding with the operation in this countries of the Sahel poses problems, which can only be solved if appropriate products and equipment are used. A suitable procedure also has to be followed for the intermediate storage of treated seeds; the advantages and drawbacks of the 2 procedures available - refrigerated storage and packaging - storage in a modified atm. - are described and compared. The field performance of seeds produced during these trials is then described, according to the results obtained on small holdings and on stations, and an indication is given of the reception they received from users. The article finishes with an analysis of the true prospects for developing this new procedure in Africa. AA

Mustards

886

Zhang (X) and Brusewitz (GH). **Water absorption by cracked mustard.** *Cereal Chemistry* 70(2); 1993; 133-136

The water absorption rate (WAR) was determined for whole mustard seed and for seed cracked by 7 cracking treatments, including 2 types of mills, 3 roller mill gaps, 2 hammer-mill feed rates, 3 seed-cracking temp. and two soaking temp. The absorption rate was obtained by measuring the amount of water that a sample imbibed from a water source during a given period. The parameters in a logarithmic model for water absorption as a function of soaking time did not vary with the different cracking treatments. The diffusion coeff. computed to be 1.58 x 10^{-7} ^{cm2}sec for whole seeds, was used in the diffusion equation to derive an equivalent av. particle diam. The equivalent particle diam. ranged from 2.02 mm for whole mustard to 0.50 mm for finely cracked samples. The WAR of mustard was less for larger roller mill gaps and a higher feed rate through the hammer mill. Seed-cracking temp. had no measureable effect on the WAR. Higher soaking temp. produced a higher WAR. AA

Nutmeg

887

Borges (P) and Pino (J). **Preparation of nutmeg oleoresin by alcohol extraction.** *Die Nahrung* 37(3); 1993; 280-282

In the present work an attempt is made to establish the conditions for preparation of nutmeg oleoresin by SOXHLET extraction with ethanol. BV

Rapeseeds

888

Mansour (EH), Dworschak (E), Lugasi (A), Gaal (O), Barna (E), Gergely (A). **Effect of processing on the antinutritive factors and nutritive value of rapeseed products.** *Food Chemistry* 47(3); 1993; 247-252

The antinutritive factors and nutritive value of rapeseed products were evaluated. The reductions in antinutritional factors by heat processing ranged from 47 to 94% for glucosinolates, from 9 to 43% for phytic acid and from 41 to 67% for tannic acid after toasting and autoclaving treatments. Isolation of proteins eliminated 72-95% of glucosinolates, 74-92% of phytic acid and 100% of tannic acid for protein concentrate and isolate. All processes destroyed trypsin inhibitor activity completely. Rapeseed products have a balanced amino acid composition and their proteins are relatively high in S-containing amino acids and lysine. The chemical score and limiting amino acids of rapessed products varied considerably, depending on the type of process. Heat treatment and isolation of proteins improved the *in vitro* digestibility of rapeseed proteins. The essential amino acid index of rapeseed products ranged from 66 to 81%. Rapeseed meal has high levels of riboflavin, niacin and pyridoxine. Riboflavin and niacin are more stable to the heat process than thiamine, pyridoxine and pantothenic acid. Many of these vitamins are lost during isolation of proteins. The meals are rich in Ca, K, P and Mg. Some minerals increased and others decreased during the processing. AA

Sesame seeds

889

Dashak (DA) and Fali (CN). **Chemical composition of four varieties of Nigerian benniseed (*Sesamum indicum*).** *Food Chemistry* 47(3); 1993; 253-255

The var. of benniseed showed high protein content (%) ranging from 17.2 (var. black) to 22.0 (var. yellow), oil (%) ranging from 34.6 (var. white) to 53.8 (yellow), essential amino acids, iodine of oil (%) ranging from 1.2 (yellow) to 110 (var. brown) and saponification values of oil (MgKOH/g) from 178 (yellow) to 191 (brown). They showed low ash content (%) ranging from 4.01 (black) to 10.1 (white), moisture (%) from 4.12 (brown) to 4.73 (black) and carbodyrate (%) from 6.85 (yellow) to 10.3 (brown). Mineral composition of the 4 var. were also given. The yellow var. is rich in lysine, methionine, cysteine and more useful for oil production. SD

Soy products

Soy milk

890

Nsofor (LM), Uzuegbu (DN), Chukwuma (AK) and Udechukwu (A). **Storage stability of concentrated soymilk: Evaluation of cow milk concentrate and salts' addition and soybean acid-steeping.** *International Journal of Food Science and Technology* 28(5); 1993; 499-504

This paper reports the evaluation of the tropical storage time and stability of sterilized (121°C, 15 min) concentrated soymilk to which cowmilk conc., sodium dihydrogen phosphate and trona (a crude alkaline salt) have been added. The effects of acid-steeping of soybeans on stability of heat-processed soymilk were also compared with those of blanching and alkali-steeping. The addition of skim-milk conc. doubled the soymilk coagulation time (stability). Addition of phosphate produced instant coagulation of soymilk after sterilization, whilst combination with trona extended soymilk coagulation time to 30 h. Steeping with HCl acid or blanching reduced coagulation time to one third of that with alkali-steeping. The longest coagulation time (280 h) was produced by a combined alkali-steeping and simmering treatment. Soymilk pH decreased on coagulation. Destabilization of concentrated soymilk by added phosphate salt is a reversal of the known stability it confers on evaporated milk. AA

TUBERS AND VEGETABLES

Onions

891

Thamizharasi (V) and Narasimham (P). **Effect of heat treatment on the quality of onions during long-term tropical storage.** *International Journal of Food Science and Technology* 28(4); 1993; 397-406

Onion bulbs (cv. Nasik red) were exposed to hot air currents prior to storage to curtail storage losses. Treatments at 80°C for 30 min or 60°C for 1 h resulted in heat damage while temp. of 60°C for 30 min or 50°C for 3 h or 40°C for 48 h did not cause any heat damage to the bulbs. A commercial lot treated at 47, 50 or 53°C for 3 h and another commercial lot treated at 47 or 50°C for 2-5 h, were stored for 4 or 5 months in ventilated polyethylene bags at (1) ambient conditions 20-30°C, RH 50-80% and (2) 21 plus or minus 1°C, RH 60-65%. In general the treated lots had more marketable bulbs, with less incidence of *Aspergillus niger* infection than untreated controls. Factorial experiments using temp. 47, 50 and 53°C with durations of treatment between 2 and 5 h revealed that the temp. and duration of heat treatment had a significant effect on the yield of good bulbs and reduction in microbial spoilage during storage. Treatment at a temp. from 47 and 50°C for a duration between 2 and 4 h gave best results when stored at 21 plus or minus 1°C. The effect of treatment lasted up to 3 months in storage. AA

Root vegetables

892

Bradbury (JH). **Human nutrition and post harvest technology of tropical root crops.** *ASEAN Food Journal* 8(4); 1993; 127-133

This paper compares some major plant food sources (rice, kidney beans, lima beans, mung beans, edible greens, cassava, sweet potato, yam and taro) in human nutrition and nutritional changes during cooking of tropical root crops. The poor performance of root crops during storage is discussed, and post-harvest treatments are considered and other uses of tropical root crops are covered. 36 references. SRA

Carrots

893

Chopra (CS) and Verma (NS). **Osmo-vacuum drying of carrots: Effect of size of pieces on drying behaviour and product quality.** *Beverage and Food World* 21(2); 1994; 7-8

The study indicated that the wt. loss, water loss and non-enzymic browning increased with increase in the size of pieces whereas sucrose gain, rehydration ratio and water content in the rehydrated pieces showed an inverse trend. However, statistically these changes were insignificant. Vacuum drying of large sized pieces required 33% more drying time than the small or medium ones. SRA

Cassava

894

Yeoh (H-H) and Truong (VD). **Quantitative analysis of linamarin in cassava using a cassava β-glucosidase electrode.** *Food Chemistry* 47(3); 1993; 295-298

Linamarin content of 18 cassava var. determined by this procedure which is claimed to be simple and reliable, ranged from 24-395 mg/100 g fresh-wt. root being comparable to those obtained by spectrophotometric method for which hazardous chemicals like pyridine is used. A steady state value is obtained in 15-20 min with the limit of detection of 0 mM linamarin. SD

895

Teles (FFF), Del Borges (VE) and Gaspar (JCJr). **An easy technique for rapid determination of dry-matter content in cassava roots (*Manihot esculenta* Crantz).** *Food Chemistry* 47(4); 1993; 375-377

A simple, quick and accurate new method based on common microwave oven and top-load balance for DM in cassava roots is reported. The results are comparable to AOAC method. SD

896

Padmaja (G), George (M) and Moorthy (SN). **Detoxification of cassava during fermentation with a mixed culture inoculum.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 473-481

The efficacy of a mixed culture inoculum in detoxifying intact cassava tuber and peel pieces was investigated. Fermented cassava tuber and peel pieces had more linamarase activity than the non-fermented control samples and this might have resulted partly from the release of endogenous linamarase from the retted tuber/peel pieces and partly due to the microbial linamarase. Approx. 24-26% of the total cyanide remained in the bound form in the fermented tuber while 67-79% existed as bound cyanide in the non-fermented controls. In cassava peels, only 15 - 33% of total cyanide remained in bound form after 72 h fermentation while 58-59% cyanide existed in bound form in the parallel non-fermented control peels. Free cyanide which could be easily eliminated through sun-drying was present at higher concn. in the fermented tuber and peel compared with the non-fermented samples. The study showed that cassava tuber and peel could be extensively detoxified through fermentation with a mixed culture inoculum. AA

Sweet potatoes

897

Morrison (TA), Pressey (R) and Kays (SJ). **Changes in** α- and β-amylase during storage of sweet potato lines with varying starch hydrolysis potential. *Journal of the American Society for Horticultural Science* 118(2); 1993; 236-242

The activities of α-and β-amylase in fresh, cured and stored roots and alterations in reducing cv. Jewel and staple-type sweet potatoes'Samor' are described. The mechanisms by which staple-type lines have repressed starch hydrolysis are explored using polyclonal antibody to sweet potato β amylase. α-amylase and β-amylase activity rose in roots of all lines after harvest and reached max. after approx. 90 days storage. In raw roots, individual and total sugar concn. were significantly higher but only trace amounts of maltose were found in raw roots. SRA

Vegetables

898

Walash (MI), Belac (F), Metwally (ME) and Hefnawy (MM). **Spectrophotometric determination of Maneb, Zineb and their decomposition products in some vegetables and its application to kinetic studies after**

green house treatment. *Food Chemistry* 47(4); 1993; 411-416

The method uses 2,6-dibromoquinone chlorimide (DBO) and 2,6-dichloroquinone chlorimide (DCQ) and depends upon releasing ethylenebis-dithiocarbamate (EBDC) moiety from Maneb and Zineb using ethylenediamine tetracetic acid disodium salt as solvent. EBDC reacts with DBQ or DCQ yielding red colour with max. absorption at 495 nm. Decomposition product ethylene thiourea produces yellow colour with max. absorption at 385 nm. These compounds were successfully determined in cucumber and tomato fruits grown in green houses. The % extraction of Maneb and Zineb from cucumber was 94.5% and from tomato 89.2%. The rate of disappearance of Maneb and Zineb showed a significant positive correlation with the rate of growth of cucumber and tomato. SD

899

Kiranoudis (CT), Maroulis (ZB), Tsami (D) and Marinos-Kouris (D). **Equilibrium moisture content and heat of desorption of some vegetables.** *Journal of Food Engineering* 20(1); 1993; 55-74

The equilibrium moisture content of potato, carrot, tomato, green pepper and onion was determined within the range of 10 to 90% a_w at 3 different temp. (30, 45 and 60°C), using the standard static gravimetric method developed by the European Cooperation Project COST 90. The GAB equation was fitted to the experimental data, using the direct nonlinear regression analysis method and the agreement between experimental and calculated values was satisfactory. The net isosteric heat of desorption of water was determined from the equilibrium desorption data, using the Clausius-Clapeyron equation. An empirical exponential relationship between the net isosteric heat sorption and the moisture content was proposed and validated. AA

Asparagus

900

Hurst (PL), King (GA), Woollard (DC) and Borst (WM). **Nitrogen metabolim in harvested asparagus: No difference between light and dark storage at 20°C.** *Food Chemistry* 47(4); 1993; 329-332

Protein, amino acid and ammonia levels and glutamine synthetase activity in tip sections (3-30 mm) of asparagus spears (*Asparagus officinalis* L. cv Limbras 10) stored upto 48 h in continuous light or dark at 20°C were monitored. The effect of light and darkness was almost identical. Protein increased by 20% after 12 h and declined to the harvest level after 48 h. Ammonia increased slightly by 48 h. Glutamine synthetase activity increased 10-15% by 18 h and declined to 90% by 48 h. Glutamic acid and glutamine were the most abundant amino acids amounting to 42%. Amino acids increased substantially by 48 h with aspargine amounting to 28%. Results indicate that post harvest nitrogen metabolism in asparagus spear tips is not modulated by light. SD

901

Hurst (PL) and Clark (CJ). **Post-harvest changes in ammonium, amino acids and enzymes of amino acid metabolism in asparagus spear tips.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 465-471

Changes in total protein and ammonium levels in harvested asparagus spear tips over 5 days at 20°C were analysed. Total protein ocntent in spear tips rose slightly at the beginning of the post harvest period but steadily declined. Over 5 days 34% of the total protein was lost. Soluble protein declined steadily over 5 days. Ammonium content of tips remained constant over 2 days and increased 2.5 fold over the next 2 days before increasing to 10-fold harvest level by 5 days. Most amino acids increased during storage with a tendency to level off or decline slightly towards the end of the storage period. GS

Cucumbers

902

McDonald (LC), Shieh (D-H), Fleming (HP), McFeeters (RF) and Thompson (RL). **Evaluation of monolactic-deficient strains of *Lactobacillus plantarum* for use in cucumber fermentations.** *Food Microbiology* 10(6); 1993; 498-499

This study was designed to evaluate selected MDC$^-$ and MDC$^+$ parent cultures of *Lact. plantarum* as to: (1) generation and lag times in broth culture at 0 to 6% NaCl and 15 to 40°C; (2) malic acid decarboxylation, sugar use, and acid formation; and (3) ability of MDC$^-$ cultures to dominate cucumber fermentations. 1 MDC$^-$ strain, designated MOP3-M6, was selected for further development because of its relative dominance in cucumber fermentations, high residual malic acid concn. after fermentation and greater salt tolerance as compared to its closest rival mutant culture. Growth lag and generation times averaged 1.6 and 1.2 times greater, respectivley, for MOP3-M6 mutant than its parent. However, this mutuant may still have application as a starter culture for cucumber fermentation, particularly under relatively aseptic conditions. SRA

Tomatoes

903

Singh (RP), Mital (BK) and Nath (N). **Determination of process time for cold-break tomato juice.** *Beverage and Food World* 21(4); 1994; 20-23

A method is developed to obain a palatable juice by cold-break and to standardise a schedule for its in-bottle processing. Tomato juice, immediately after cold extraction, was boiled for 1 min to inactivate pectin methyl esterase. It was adjusted to 6% TSS using cane sugar, 0.6% citric acid and 0.8% NaCl. Process times for juice were based on F18 = 0.7 min, processing temp. of 240°F and retort come-up time of 6 min. For cold-filled juice it was found to be 11.9 to 12.6 min by formula method and 14.1 to 16.6 min by graphical method. The values for hot-filled juice were 11.9 and 12.6 min respectively. Bottled juice processed for 11 min was sterile and retained their quality well during 90 days storage under ambient conditions. SRA

904

Bolzoni (L), Sannino (A) and Bandini (M). **Determination of ethylenethiourea and propylenethiourea in tomato products and in fruit purees.** *Food Chemistry* 47(3); 1993; 299-302

With this method 100 samples of commercial products - pulp, puree, paste, peeled tomatoes and ketchup were analysed. The residues were extracted with dichloromethane on an extrelut column and clean-up was carried out using a Sep-Pak C18 catridge before injection into a liquid chromatograph with an electrochemical detector (coulometer). The sensitivity of the method is 3 μg/kg for tomato products with a total solids content similar to that of fresh tomatoes and of fruit purees with a soluble solids content of 10°Brix. SD

905

Porretta (S), Poli (G), Rondelli (M) and Zanangeli (G). **Quality evaluation of tomato pulp.** *Food Chemistry* 47(4); 1994; 379-386

For 8 commercial brands of tomato pulp, 26 physico-chemical parameters and 3 sensory attributes were determined. Principal component analysis of data revealed that these physico-chemical parameters contributed to 37% of the variations for acidity, 23% for natural taste and 12% for viscosity. Discriminant analysis of data showed 3 classification of the brands. SD

906

Grubinger (VP), Minotti (PL), Wien (HC) and Turner (AD). **Tomato response to starter fertilizer, polyethylene mulch and level of soil phosphorus.** *Journal of the American Society for Horticultural Science* 118(2); 1993; 212-216

Four field exp. were tried to compare the response of tomatoes to starter fertilizer (SF) in mulched (M) and unmulched (UM) situations that varied in residual P (RP) and the amount of P incorporated before planting. No benefits from SF were obtained on soil with high RP that was moderately fertilized with P before transplanting or on soil with low RP that was heavily fertilized with P. A positive effect from SF was observed only when RP was low and no P was broadcast in M and UM plots. No significant SF by M interaction was obtained in these exp. eventhough M consistently increased shoot P concn. and fruit yield. The M was beneficial even under conditions where UM tomato leaves contained 0.4% P 3 wks after transplanting that factors in addition to improved P nutrition are also involved in the M effect. SRA

FRUITS

907

Ladeji (O) and Okoye (ZSC). **Chemical analysis of the fruit of *Vitex doniana* (Verbanaceae).** *Journal of the Science of Food and Agriculture* 63(4); 1993; 483-484

Analysis of black plum (*Vitex doniana*) indicated a fruit with useful nutritional value in tropical African diets (crude protein 27.5, lipid 49.5, sugars 842 g kg^{-1} DM; moisture 488 g kg^{-1} FW) and possibly a good shelf-life. AA

Cherimoya

908

Lahoz (JM), Gutierrez (M), Sola (MDM), Salto (R), Pascual (L), Martinez-Cayuela (M), Vargas (AM). **Ethylene in cherimoya fruit (*Annona cherimola* Mill.) under different storage conditions.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 721-723

Southern Spanish coast cherimoya fruits grown in the subtropical valleys were stored at 20 or 10°C. Production of ethylene was dependent on the storage temp. of the fruits, having max. values of 46.2 plus or minus 2.7 μL of ethylene kg^{-1} h^{-1} in cherimoya stored at 20°C and 1.91 plus or minus 0.03 μL of ethylene kg^{-1} h^{-1} when they were stored at 10°C. Effect of ethylene on the ripening of cherimoya are discussed. BV

Mangoes

909

Aina (JO) and Oladunjoye (OO). **Respiration, pectolytic activity and textural changes in ripening African mango (*Irvingia gabonensis*) fruits.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 451-454

Post-harvest changes in fruit firmness, respiration, pectinesterase (PE) and polygalacturonase (PG) activities were followed in African mango fruits during storage ripening at tropical ambient conditions (28 plus or minus 1°C and 68 plus or minus 2% RH). Respiration followed a climacteric pattern attaining a peak of 99.37 ml CO_2 $kg^{-1}h^{-1}$ on the 5th day of storage while full ripeness (colour index - 5) was attained on the 10th day. PE and PG activities increased with progressive fruit ripening attaining their optima on the 5th day (1.8 PE unit) and 10th day (27 PG units), respectively. Fruit firmness decreased as pectolytic activity increased with a concomitant reduction in the deformation force than 49 kPa in the unripe fruit at 25 kPa at the edible ripe stage. AA

Muskmelon

910

Lester (G) and Stein (E). **Plasma membrane physico-chemical changes during maturation and postharvest storage of muskmelon fruit.** *Journal of the American Society for Horticultural Science* 118(2); 1993; 223-227

This paper describes the lipid matrix composition of the hypodermal-mesocarp tissue plasma membranes from ripening muskmelon (*Cucumis melo*) fruit and compares it with changes in membrane permeability, density and ATPase activity. Increased membrane permeability in muskmelon fruit coincides with an increase in total free sterol: total phospholipid ratio and increase in phospholipid fatty acid saturation index of plasma membrane. The postharvest environment (storage at 4 or 24°C) and vapour pressure difference approx. 3.8 fold) affects mature muskmelon fruit membrane permeability. Vandata-sensitive ATPase (EC 3.6.1.35) activity was highest in mature fruit at harvest. SRA

Pears

911

Joubert (E). **Processing of the fruit of five prickly pear cultivars grown in South Africa.** *International Journal of Food Science and Technology* 28(4); 1993; 377-387

In tests of processing 5 cvs of prickly pear fruit, lye-peeling was not effective as peel was partially removed and flesh erosion occurred. When hand peeled fruit were canned in acidified sucrose syrup (20°B) at 100°C for 15 min, differences between cv firmness were observed; fruit firmness decreased with increasing processing time, but increased on addition of 0.25% $CaCl_2$ to the syrup. Canned fruit stored for 22 months were still firm and retained their shape, but yellow to orange colour cvs lost much of their colour by loss of indicaxanthin. The canned fruit developed a gherkin jam-like uncharacteristic flavour. Fruit yielded between 55% and 68% edible portion which contained 65-76% turbid juice with a soluble solids content of 10-14%. The peel contained approx. 10% soluble solids and 4% sugar, mostly fructose and glucose. Pectin methylesterase activity differed slightly between cvs. AA

Strawberries

912

Wilson (RH), Slack (PT), Appleton (GP), Li Sun and Belton (PS). **Determination of the fruit content of jam using Fourier transform infrared spectroscopy.** *Food Chemistry* 47(3); 1993; 303-308

Fruit content in strawberry jam was determined by using dried jam and the potassium bromide pellet technique in combination with simple linear regression and partial least square analysis. Using diffuse reflectance of jam solids washed on filter papers produced spectra of unusual appearance, and thereby indicated the level of fruit content as well as the adulteration. SD

CONFECTIONERY, STARCH AND SUGAR

913

Spiegel (JE), Rose (R), Karabell (P), Frankis (VH) and Schmitt (DF). **Safety and benefits of fructooligosaccharides as food ingredients.** *Food Technology* 48(1); 1993; 85-89

Fructooligosaccharides, naturally occurring sugars as a potential food ingredients, their safety and their use to improve the flavour of unsweeteened low-fat yoghurts is discussed in this article. CSA

Sugar

914

Kapseu (C), Ahmed (A) and Tedga (N). **Contribution to the reduction of loses in a sugar factory - cane refinery.** *Journal of Food Engineering* 20(1); 1993; 45-53 (Fr)

BAKERY PRODUCTS

915

Gelinas (P), Lagimoniere (M) and Dubord (C). **Baker's yeast sampling and frozen dough stability.** *Cereal Chemistry* 70(2); 1993; 219-225

The cryotolerance of 6 commercial baker's yeast strains grown under identical incremental feeding (fed-batch) conditions was evaluated in frozen doughs. Slight differences in survival were observed between yeast strains subjected to rapid freezing rates (about 10°C/min). All strains showed similar cryotolerance at slow freezing rates (about 1°C/min) followed by storage for 12 wks. As part of a collaborative study between 2 lab., 21 commercial baker's yeast samples from 7 trademarks (from which most strains were screened) were compared on the basis of their cryotolerance in frozen doughs. A rapid freezing test (measuring gas production) and 3-month storage tests (measuring gas production, dough proofing time, and bread specific vol.) showed that yeast cell cryotolerance varied greatly among the commercial yeast samples used to prepare frozen doughs. Because of the great variability in cryotolerance among yeast samples, none of the 7 yeast trademarks tested from Canada, France, and the United States was superior to the others. These results show that the major effect on frozen dough stability is the commercial baker's yeast sampling rather than strain or trademark, and they stress the importance of quality control for cryotolerance of the baker's yeast samples used in frozen dough production. AA

916

Oda (Y) and Tonomura (K). **Sodium chloride enhances the potential leavening ability of yeast in dough.** *Food Microbiology* 10(3); 1993; 249-254

When *Saccharomyces cerevisiae* FL2209, a baking strain isolated from commercial compressed yeast, was cultured in YPS medium composed of 2% Bacto-yeast extract, 4% Bacto-peptone, 2% sucrose, 0.2% KH_2PO_4 and 0.1% $MgSO_4.7H_2O$ (pH 6.0), it showed higher leavening abilities in 3 types of doughs compared to those of the commercial compressed yeast, but not in sweet dough. Addition of NaCl to YPS medium resulted in the increase of leavening abilities in all of the doughs tested. Effects of NaCl were further investigated in 7 other yeast strains including 6 *S. cerevisiae* strains and one *Torulaspora delbrueckii* strain. NaCl commonly elevated the leavening abilities of 5-maltose-fermenting *S. cerevisiae* strains in dough without addition of sugar. Sweet dough leavening was stimulated by NaCl in only one strain of *S. cerevisiae*. Leavening abilities of *T. delbrueckii* were reduced when cultured in the presence of NaCl. YPS medium with the addition of NaCl was shown to be available to estimate the potential leavening abilities of most yeast strains. AA

917

Hounhouigan (DJ), Nout (MJR), Nago (CM), Houben (JH) and Rombouts (FM). **Composition and microbiological and physical attributes of mawe, a fermented maize dough from Benin.** *International Journal of Food Science and Technology* 28(5); 1993; 513-517

Home-scale and commercial mawe samples produced in urban Benin were very similar in composition, particle size, dough viscosity, and microbial loads, with titratable acidity 1.2 - 1.4% w/w (as lactic acid); home-produced mawe had a slightly higher pH (4.2), protein, fat, fibre, and ash than commercial mawe. Lactobacilli and yeasts predominated in both. AA

Bread

918

Lues (JFR), Viljoen (BC), Miller (M) and Prior (BA). **Interaction of non-culture microbial flora on dough fermentation.** *Food Microbiology* 10(3); 1993; 205-213

In this study the influence of microbial interactions amongst the different genera and *Saccharomyces cerevisiae* was determined and assessed whether the inhibition of the undesirable organisms resulted in an improvement in fermentation during bread making. The Gram-positive bacteria had a stimulatory effect on fermentation, while Gram-negative bacteria inhibited fermentation. The addition of *Lactobacillus* spp. and wild species of *Saccharomyces* resulted in the most significant improvement in the performance of CO_2 production. The cumulative effect of a mixture representing all the microbial flora usually encountered in bread dough, however, resulting in an increase in fermentation ability. For optimum fermentation and to obtain optimum taste, texture and shelf-life of bread, the undesirable organisms have to be reduced. SRA

919

Martinez-Anaya (MA), Pitarch (B) and de Barber (CB). **Biochemcial characteristics and breadmaking performance of freeze-dried wheat sour dough starters.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 360-365

Four mixtures (I-IV) of pure yeasts (*Saccharomyces cerevisiae*, *S. fructuum* and *Candida boidinii*) and/or lactobacilli (*Lactobacillus brevis* and *L. plantarum*) were inoculated into wheat sourdoughs, which after 18 h fermentation time were freeze-dried and used as starters (DS). Before their addition to wheat doughs they were rehydrated and reactivated. Besides DS (20% flour basis), bread dough contained instant active dry yeast (0.6%). Biochemical characteristics (production of organic acids, evolution of sugars and headspace composition), and breadmaking performance (fermentative and rheological properties and bread quality) of these doughs were investigated and compared with control doughs (C) without DS. Doughs with DS showed lower gassing power, and pH, and higher total titratable acidity (TTA) than C.

The dough level in the maturogram reached max. values for C and DS (IV) with only lactic acid bacteria. Doughs with DS (IV) also led to lower values for extensibility, and higher resistance to extension in the extensigram. The dymanics of glucose and fructose were faster during fermentation of doughs with DS than for C. The lactic and acetic acid levels were higher in DS-containing doughs, but ethanol and ethyl acetate contents were greater for C. Some bread characteristics (vol., density, pH, TTA, organic acids and sugar contents) were similar for all DS samples, and, except for sugars, significantly differed from those of C. Generally, sensory bread scores were higher for DS breads than for C, mainly for loaf shape, vol., edibility and overall acceptance. Starters I and IV, with the same composition of lactobacilli, showed a similar performance over starters II, III and C. AA

Chapathies

920

Gupta (TR). **Thermal conductivity of Indian unleavened flat bread (*chapati*) at various stages of baking.** *Journal of Food Process Engineering* 16(3); 1993; 227-235

A steady state technique was used to measure thermal conductivity of whole wheat dough (rolled chapati) and bread *chapati* (round disc prepared mostly from whole wheat flour dough) at various stages of cooking. Based on the experimental data of *chapati* at various stages of cooking, a linear equation $K = -0.5677 + 0.01396\ M + 0.005131\ T$ is proposed for conductivity of wheat flour dough and baked *chapati* at moisture levels (M); $35 < M < 50$ and temp. ranges $35 < T < 60$. A separate equation $K = 0.3204 + 0.0091\ M - 0.00805\ T$ predicts thermal conductivity of rolled *chapati* and baked *chapati* at $T > 60^{\circ}$C. AA

Pasta

921

Edwards (NM), Izydorczyk (MS), Dexter (JE) and Biliaderis (CG). **Cooked pasta texture: Comparison of dynamic viscoelastic properties to instrumental assessment of firmness.** *Cereal Chemistry* 70(2); 1993; 122-126

Extruded noodles (EN) were prepared from durum wheat semolina of variable protein content to provide a series of samples with a range of cooking quality. Firmness of cooked EN was measured using an Instron Universal Testing Machine and compared with the storage modulus and dynamic viscosity obtained by dynamic rheometry. A strong correlation (r^2 at least 0.87) was found between the Instron values and the rheometer measurements at both optimum and overcooking times, indicating the sensitivity of dynamic rheometry to changes in pasta firmness. The Instron peak force measurement was found to be a more precise indicator of noodle firmness than was peak energy. The rheometer was able to differentiate between samples and to rank the noodle samples in the same order as the Instron did. Although moisture content was shown to have a major influence on the texture of cooked noodles, the differences in moisture between samples were not sufficient to produce the differences measured by either the Instron or by dynamic rheometry. AA

922

Maldari (D) and Maldari (C). **Design and performance of pasta dies.** *Cereal Foods World* 38(11); 1993; 807, 809-810

The article traces the history and development of present-day dies and discusses the considerations in designing dies for pasta production and some factors affecting die performance. CSA

MILK AND DAIRY PRODUCTS

923

Rao (SVN), Kherde (RL) and Sohal (TS). **Adoption of dairy innovations. A review.** *Indian Journal of Dairy Science* 46(9); 1993; 393-400

This paper reviews the studies conducted on adoption of innovations with reference to dairy innovations which may be of interest to all those associated with production, transfer and utilisation of these innovations. Aspects covered are, stages of adoption, extent of adoption, reasons for adoption or rejection (the technology, farmer, extension agency, infrastructure). 65 references. SRA

924

Sriram Padmanabhan, Archana Chitre and Shastri (NV). **Milk clotting protease isolated from *Dieffenbachia maculata*.** *Die Nahrung* 37(1); 1993; 99-101

Milk

925

Pagote (CN) and Balachandran (R). **Storage stability of acidified milk beverage. I. Lipolytic and proteolytic changes.** *Indian Journal of Dairy Science* 46(9); 1993; 431-434

The thio-barbituric acid, free fatty acids and non-protein nitrogen contents of sterilized (110°C for 5 min) directly acidified milk beverage increased during storage at 5°C and 30°C. The increase being faster for above 3 parameters after 60, 45 and 60 days of storage period at 30°C for samples packed in glass bottles (GB) and metallised polyester/polyethylene pouches (MP/PP). In general, lipolytic and proteolytic deterioration during storage at 30°C in GB compared to the MPPP. Hence MPPP may be prefered over GB for packing directly acidified milk beverage for longer shelf-life. SRA

926

Pagote (CN) and Balachandran (R). **Storage stability of acidified milk beverage. II. Physical and chemical changes.** *Indian Journal of Dairy Science* 46(9); 1993; 435-439

Changes in physical and chemical attributes of directly acidified milk beverage (AMB) were studied upto 120 days of storage period. The sediment content, reducing sugar, total hydroxymethyl furfural content and viscosity increased during storage period, whereas colour (reflectance) and pH values decreased slightly. In general, the physical and chemical changes during storage were noticed to greater extent in the samples which were stored at 30°C in glass bottles than in metallised polyester pouches and stored at 5°C temp. AA

927

Raccah (M) and Geshell (DJ). **The inhibition of *Listeria monocytogenes* in milk by pediococci.** *Food Microbiology* 10(3); 1993; 181-186

The study evaluates and screens the antilisterial activity of pediococci inoculated in milk along with each of 4 strains of *L. monocytogenes*. Results indicated that the commercial culture *P. acidilactici* Pa did not control the growth of *Listeria* OH at 32°C in the milk. There was no significant difference ($P < 0.01$) among the different strains of *Listeria* growing in pure culture (control) in milk at 4.5 and 32°C. The population attained was about $\log_{10}$ 9.0 cfu ml^{-1} after 4 and 6 days respectively. The strain *P. pentosaceus* FBB-61 brought about reduction (> 4.0-log) in population of *L. monocytogenes* V7 after 4 days at 32°C. Regardless of the mechanism of inhibition, the strains of pediococci PAC, PO_2 FBB-1 and L7230 caused decline in the viable members of *Listeria* in milk. SRA

928

Singh (R) and Deodhar (AD). **Quantitative assessment of total bound and free forms of thiamine and riboflavin in cow milk and curd.** *Indian Journal of Dairy Science* 46(11); 1993; 525-528

The total, bound and coenzyme forms of riboflavin and thiamine were determined in the raw and pasteurized cow milk as well as curd made from it by fluorometric procedures. Thiamine in test materials was liberated by treatment with (i) takadiastase + papain, (ii) pepsin and (iii) takadiastase. The milk was pasteurized by holding method. The curd was prepared with *Lactococcus lactis* ssp. *lactis* and *cremoris* and *Propionibacterium shermanii* as starter cultures. Total thiamine contents in raw, pasteurized cow milk and curd were 32.2 plus or minus 0.02 μg/100 ml, 21.96 plus or minus 0.02 μg/100 ml and 21.93 plus or minus 0.01 μg/100 g respectively. Total riboflavin contents were 155 plus or minus 0.06 μg/100 g, 153 plus or minus 0.05 μg/100 g and 2.23 plus or minus 0.06 μg/100 g in raw, pasteurized cow milk and curd, respectively. Free forms of thiamine and riboflavin in the milk were 48 and 68% respectively, whereas 38% thiamine and 32% riboflavin in the milk occurred in the bound form. Only small per cent of total riboflavin (14.8% as FAD and 17.4% as FMN) was present in the coenzyme forms associated with protein. 52% of the total thiamine in milk occurred in the form of TPP. The % of free forms of these vitamins significantly increased on fermentation. It was concluded that the bioavailability of thiamine and riboflavin may be greater from curd than milk. AA

929

Patel (DA) and Sannabhadti (SS). **Effect of activation of lactoperoxidase system and heating to thermization temperature on shelf-life of buffalo raw milk.** *Indian Journal of Dairy Science* 46(11); 1993; 529-534

Activation of LP system significant extension in shelf-life (at 37°C) i.e. 3 h at 15:10 p.p.m. SCN: H_2O_2 and 6 h at 45:30 p.p.m. SCN:H_2O_2 as judged by CoB test in comparison to buffalo raw milk control (without any preservative) which had the shelf-life of 5 h. LP at 3 times higher magnitude than that proposed by IDF (1988), however, failed to give proportional advantage in prolongation of shelf-life. Thermization heat treatment at 60°C/20 s and 65°C/20 s did not show marked influence on extension in keeping quality of buffalo raw milk with similar conditions of storage. However, relative retardation of acidity development due to thermization heat treatment merits further considerations. Heating to thermization temp. in combination with LP failed to give significant enhancement in shelf-life as compared to LP treatment alone. However, LP followed after heating to thermization temp. showed slightly better inhibitory influence in comparison to other combination. Heating to thermization temp. singly and in combination gave CoB test positive at slightly lower acidity value in comparison to LP. AA

Milk products

930

Adhikari (AK), Mathur (ON) and Patil (GR). **Development of microstructure in acid and heat coagulated indigenous milk products: A comparative scanning electron microscope study.** *Indian Journal of Dairy Science* 46(10); 1993; 477-482

Scanning electron microscopy was carried out on 2 indigenous milk product viz. chhanna and khoa to study their comparative microstructural attributes. Cow milk chhanna showed threaded, smooth protein agglomerates interlinked through thick protein bridges forming numbers small voids in between. However, buffalo milk channa had large, ragged coalesced protein particles, forming a dense, carded cotton like structure with fewer voids. Whereas, khoa had quite different structural manifestations to that of chhanna. Casein whey protein complexes fused denselyt with lactose forming a continuous gritty mass in cow milk khoa, while in buffalo milk khoa the agglomerated, thread-like protein-lactose complexes formed a ragged, loose matrix with numerous voids throughout. Chhana and khoa differed significantly in microstructure mainly due to acid and heat treatments, while the differences in cow and buffalo milk products were mostly due to the dissimilarities in casein micelles size, soluble and miceller proportion of caseins and salt balance in the respective milks. AA

Butter

931

Nadia (AA-Z) and Soliman (HA). **Effect of packing materials on *samna* stability and its fatty acid composition.** *Indian Journal of Dairy Science* 46(10); 1993; 473-476

Results of the study indicated a significant effect of different types of packages (tin cans (T), pottery pots (P), greasy pottery pots (GP), dark glass cans (GC), LDPE cans (LDPEC), PVC cans (PVCC) and lacquered tin cans (LTC)) on the keeping quality and fatty acid (FA) composition of *samna* (pure butter fat). *Samna* packed in PVCC showed highest stability during storage, followed by that packed in GC, LTC, GP, LDPEC, P and T. The relative concn. of total volatile FA, saturated and unsaturated FA was greatly affected by the packaging material at 6 and 12 months storage, while at 18 months the differences between various samples were not detectable due to decomposition of some FA as storage period advanced. SRA

932

Jha (YK). **Use of ultrafiltration in cheese industry.** *Beverage and Food World* 21(2); 1994; 12-14

Membrane process, ultrafiltration (UF) in cheese making, control of retentate composition, effect of UF on milk components, technical problem arising during the conversion of conc. milk into cheese (viscosity of retentate, starter acidity, coagulation of conc. milks) differences between the composition of UF and conventional cheese Ca and whey protein (Ca to protein ratio in UF, extra protein content of UF cheese, influence of whey proteins on the properties of cheese, and denatured whey protein in UF cheese, heat denatured whey protein in UF cheese, UF cheese yields methods by which UF cheese making can increase the yield, whey protein retention and yield, fat retention and yield), var. where UF cheese making is most successful are discussed in this paper. SRA

933

Shantha (NC) and Decker (EA). **Conjugated linoleic acid concentrations in processed cheese containing hydrogen donors, iron and dairy-based additives.** *Food Chemistry* 47(3); 1993; 257-261

Hydrogen donors (butylated hydroxytoluene, propyl gallate, cysteine, ascorbic acid) and dairy additives (sodium caseinate, sweet whey powder and non-fat dry milk) are capable of increasing the conjugated linoleic acid content in processed cheese. Propyl gallate was the most effective hydrogen donor tested, increasing the total and 9 *cis*, 11 *trans* (9c, 11t) CLA contents 1.59- and 1.42-fold, respectively. Among the dairy additives sodium caseinate at a concn. of 6% was the most effective, increasing the total CLA concn. 1.65-fold compared to processed cheese with no additive. Nonfat dry milk and whey powder produced 1.57- and 1.56-fold increases in CLA concn., respectively. Lipid oxidation systems such as Fe^{2+} and Fe^{3+}/ascorbate were also effective at increasing the CLA content in processed cheese. At 500 p.p.m. Fe, the increase in total CLA was 1.56-fold for Fe^{2+} and 1.44-fold for Fe^{3+}/ascorbate. AA

934

Bullens (C), Krawczyk (G) and Geithman (L). **Reduced-fat cheese products using carrageenan and microcrystalline cellulose.** *Food Technology* 48(1); 1994; 79-81

Development of low-fat cheese products that reduce calorie intake and minimize health risks associated with high-fat levels in their diet using carrageenan and microcrystalline cellulose is discussed in this article. CSA

Camembert cheese

935

Tsuda (T), Yamada (M) and Nakazawa (Y). **Study of the distribution of lower molecular weight peptides in Camembert cheese using capillary isotachophoresis.** *Indian Journal of Dairy Science* 46(10); 1993; 489-493

Capillary isotachophoresis (IP) was used to analyze lower mol. wt. peptides (LMWP) and amino acids on 9 samples of Cammembert cheese ripened for 5 wks. A sensitive method was described for the identification of LMWP using IP. The main conditions of analysis were (1) hydrochloric-ethanolamine as the leading sol. at pH 9.3 and 9.5 and (2) 10 mM β-alanine as the terminating sol., the pH being adjusted to 10 by adding barium hydroxide. The TCA soluble total nitrogen content was 183 mg/100 g cheese. The X-16 fraction contained more free amino acids and di- or tripeptides and higher nitrogen content (76 mg/100 g cheese) than the X-12 and X-8 fractions. Values of individual amino acids in peptides in the 3 fractions were measured. Glutamic acid, lysine, aspartic acid, leucine and proline were much higher in a concn. than cystine, tryptophan, arginine, tyrosine, histidine and phenylanine. Similarities in the patterns of distribution of amino acids among 3 fractions were noted. LMWP and amino acids in the fractions extracted showed typical RE values previously described by other investigations. The R_E value 2.0 at pH_L 9.3 correspond to those of glutamic or aspartic acid and the R_E values 3.3, 3.9 (at pH_L 9.3) and 2.9, 3.2 (at pH_L 9.5) in the 3 fractions correspond with those of asparagine or serine. The R_E values of 5.0 (at pH_L 9.3) and 4.5 (at pH_L 9.5) in the x-16 fraction correspond to those of leucine. 4.9 (at pH_L 9.3), 4.5 (at pH_L 9.5). IP is an appropriate method to use to describe ripening phenomenon in Camembert cheese. The method utilizes differential electrophoretic patterns in analysis of LMWP in fractions extracted from cheese. AA

Cheddar cheese

936

Grazier (CL), Simpson (R), Roncagliolo (S), Bodyfelt (FW) and Torres (JA). **Modelling of time-temperature effects on bacteria population during cooling of Cheddar cheese blocks.** *Journal of Food Process Engineering* 16(3); 1993; 173-190

Differences in cooling rate of Cheddar cheese (CC) from pressing (35°C) to aging temp. (3.5 - 12°C) has been reported to be responsible for flavour variation within a production lot. During aging, starter and nonstarter bacteria contribute extensively to flavour quality. Temp. effects on these bacteria were quantified using cheese from a local processor. At day 1, starter counts were 8×10^7 cfu/g but as aging continued, starter counts decreased and non-starters became dominant. At 35°C, starter counts reached 3×10^6 cfu/g by day 3 and were below 10^6 cfu/g by day 5. At 25, 20, 15 and 12°C, starter bacteria were below 10^6 cfu/g by day 10, 20, 24 and 40, respectively. Nonstarter counts,initially at 10^4 cfu/g, reached approx. 10^8 cfu/g at increasingly shorter times with higher temp. Kinetic analysis of growth in cheese and in a liquid medium suggested the possibility of diffusion growth limitations in cheese. Computer simulations for the growth of nonstarters suggests the individual cooling of small blocks (18 kg) would reduce the contribution of nonstarter counts to CC aging. AA

Dahi

937

Dave (RI), Dave (JM) and Sannabhadti (SS). **Effect of starter culture and total solids on β-D-galactosidase activity during manufacture and storage of *dahi*.** *Indian Journal of Dairy Science* 46(11); 1993; 544-546

Three strains of *Staphylococcus thermophilus*; MD2 (C1), MD8 (C2) and D3 (C3) were used for *dahi* manufacture from 4.5% fat containing buffalo milk adjusted to (T1), 18 (T2), and 21 (T3)% level of total solids by adding condensed buffalo skim milk. T2 and T3 and C1 and C2 were at par whereas they differed significantly from T1 and C3 respectively. However, the reduction in β-galactosidase content at refrigerated storage was < that observed at room temp. storage. SRA

Khoa

938

Ranganadham (M) and Rajorhia (GS). **Low temperature drying of khoa for rural applications.** *Indian Journal of Dairy Science* 46(9); 1993; 425-430

This article deals with the technological considerations used in tray-drying of khoa at atm. pressure for rural application. The process involved standardization of milk to min. of 5% fat, khoa preparation by traditional method, dessication to 20% moisture, comminution to fine particles and tray-drying at 70°C for 4 h. The fat content and drying temp. greatly influenced the physico-chemical properties of khoa powder. Increased fat content in milk elevated the free fat content and improved sensory scores of the product. The 5 hydroxymethylfurfural content and paradimethyl amino benzaldehyde decreased with increased fat content but increased with elevated temp. of drying. SRA

Milk powders

939

Chan (S-H), Gray (JI), Gomaa (EA), Harte (BR), Kelly (PM), Buckley (DJ). **Cholesterol oxidation in whole milk powders as influenced by processing and packaging.** *Food Chemistry* 47(4); 1993; 321-328

The effects of various spray-drying processes (direct-fired heating, high levels of oxides of nitrogen (NO_x); direct-fired heating, low NO_x; indirect electrical heating) and packaging systems (polyethylene pouches and crimp-sealed glass vials, with and without oxygen absorbers) on the oxidative stability of lipids in whole milk powders during storage were studied. Lipid oxidation, including the generation of cholesterol oxidation products, was greatest in samples processed by high NO_x direct-fired driers. Oxygen absorbers effectively controlled cholesterol oxidation during the 6 month storage period, even in those samples from the high NO_x drying system. There was a positive correlation (r 0.89) between lipid oxidation and the concn. of cholestrol oxides in the samples. It was concluded that the stability of whole milk powders during storage can be improved by using the low NO_x drying processes and by packaging in oxygen-impermeable packaging systems containing oxygen absorbers. AA

Paneer

940

Pal (MA), Yadav (PL) and Sanyal (MK). **Effect of paraffining on the physico-chemical, microbiological and sensory characteristics of low-fat paneer at low temperature storage.** *Indian Journal of Dairy Science* 46(11); 1993; 519-524

This study showed a highly significant ($P < 0.01$) effect of treatments, storage period and treatments x storage on lactose, tyrosine contents, total plate counts, yeast and mould counts, TBA values, titratable acidity and pH of low-fat *paneer*. Paraffining improved the shelf-life of low-fat *paneer* by more than 10 days during storage at low temp. SRA

Yoghurts

941

El-Abbassy (MZ) and Sitohy (M). **Metabolic interaction between *Streptococcus thermophilus* and *Lactobacillus bulgaricus* in single and mixed starter yoghurts.** *Die Nahrung* 37(1); 1993; 53-58

Yoghurt was manufactured with mixed starter of *S. thermophilus* and *L. bulgaricus* or a single starter of either in the presence or absence of 600 p.p.m. free amino acids mixture (glutamic acid, histidine, cysteine, valine, methionine and tyrosine) and/or 600 p.p.m. of sodium formate. Results showed that acidity, total volatile fatty acids (TVFA), NPN, total free amino acids and soluble tyrosine contents of different yoghurt samples increased gradually during storage at 5-8°C for 7 days especially in the mixed starter yoghurt fortified with free amino acids mixture and Na formate. Organoleptic evaluation showed that the flavour of single strain starter yoghurt with free amino acids mixture of Na formate gave nearly the flavour of control yoghurt samples. However, the mixed starter yoghurt fortified with free amino acids mixture and Na formate gave more acceptable flavour. It could be concluded that addition of free amino acids mixture and/or Na formate to yoghurt stimulated the activity of starter bacteria. Also manufacture of yoghurt using a single starter of *S. thermophilus* or *L. bulgaricus* should be associated with addition of free amino acids mixture or Na formate to yoghurt milk respectively. AA

942

Vickers (ZM). **Incorporating tasting into a conjoint analysis of taste, health claim, price and brand for purchasing strawberry yoghurt.** *Journal of Sensory Studies* 8(4); 1993; 341-352

Taking notes on sensory attributes while preliminary tasting improved the proportion of completing correct re-identification. Liking ratings from memory were as stable as liking reratings by retasting. Taste and health claim showed greatest influence on buying in but not the brand name. SD

943

Tuorila (H), Sommardahl (C), Hyvonen (L), Leporanta (K) and Merimaa (P). **Sensory attributes and acceptance of sucrose and fat in strawberry yoghurts.** *International Journal of Food Science and Technology* 28(4); 1993; 359-369

Yoghurts containing approx. 0.1, 1.5, 3.2 or 5.2% dairy fat were sweetened with 6, 8, 10 or 12% sucrose and flavoured with strawberry jam. The sweetness, fattiness, and sourness of the resulting 16 samples were rated by a lab. panel ($n = 14$), and the hedonic responses by a consumer panel ($n = 41$). As expected, the sweetness and fattiness increased with increasing sucrose and fat contents, respectively. Sucrose enhanced perceived fattiness and fat enhanced sweetness. Sourness was suppressed by both. The sample with 10% sucrose and 3.5% fat received the highest, and the samples with the lowest sucrose and fat contents the lowest, pleasantness ratings. Among the consumers, men preferred high sweetness and fattiness and low sourness, but women did not show any definite tendencies. Although the consumer panel was small, the results demonstrate the importance of segmenting consumers to predict product success. AA

Milk proteins

944

McHugh (TH) and Krochta (JM). **Milk-protein based edible films and coatings.** *Food Technology* 48(1); 1994; 97-103

Reviews the important characteristics of the major types of milk proteins (total milk proteins, caseins, whey proteins) and then relates these to the properties of milk-protein-based edible films and coatings. 44 references. CSA

Casein

945

Szependowski (J), Amarowicz (R), Smietana (Z) and Kozikowski (W). **Extrusion influence on the nutritive value of casein preparations.** *Die Nahrung* 37(1); 1993; 1-4

Effect of extrusion (120°C; 8-12s; extruder S 45-12-10 U) on amino acids and nutritive value of casein preparations in the form of Ca and low-Ca paracaseinates and in acidic form was studied. The following indices were found to decrease slightly: chemical score from the range 57.4-58.8 to 57.2-58.1; essential amino acids from 86.1-88.3 to 84.9-88.1; NPU from 61.4-67.6 to 60.2-66.6; PER from 2.40-2.47 to 2.38-2.45; apparent digestibility from 84.9-87.2 to 84.8-87.2; true digestibility from 90.7-95.3 to 90.4-92.8 and biological value from 66.6-71.0 to 65.8-69.6. Results indicate that the extrusion at 120°C has no significant lowering of the protein quality in the casein preparations. BV

MEAT AND POULTRY

Meat

946

Nicolai (BM), Van Impe (JF), Verlinder (B), Martens (T), Vandewalle (J), De Baerdemaeker (J). **Predictive modelling of surface growth of lactic acid bacteria in vacuum-packed meat.** *Food Microbiology* 10(3); 1993; 229-238

A dynamic model for the growth of lactic acid bacteria on vacuum-packed meats has been constructed. The model consists of a fermentation model and a model for pH changes in the buffered liquid surface layer. Mathematically this corresponds to a system of two differential equations and two algebraic equations, respectively. Some general aspects of the spoilage of vacuum-packed meat such as the typical log-linear growth curve can be predicted using this model. SRA

947

Morehouse (KM), Kiesel (M) and Ku (Y). **Identification of meat treated with ionizing radiation by capillary gas chromatography determination of radiolytically produced hydrocarbons.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 758-763

This paper describes the results of GC analyses for radiolytically generated hydrocarbons in several meat products containing 1-30% fat. Several lipid extraction techniques investigated during these exp. are compared. Data indicating the utility of this methodology to identify meat products (poultry, beef and pork) treated with ionizing radiation are presented. BV

948

Engeseth (NJ) and Gray (JI). **Cholesterol oxidation in muscle tissue.** *Meat Science* 36(3); 1994; 309-320

949

Millar (S), Wilson (R), Moss (BW) and Ledward (DA). **Oxymyoglobin formation in meat and poultry.** *Meat Science* 36(3); 1994; 397-406

The rate of oxymyoglobin formation (blooming) was estimated by reflectance, spectrophotometry and depth of oxygen penetration, of beef and pork *L. dorsi* and chicken breast muscles of normal ultimate pH. Although beef bloomed very rapidly when exposed to air, even at 23°C, pork muscle exhibited little evidence of oxymyoglobin formation at this temp. and no chicken muscle produced oxymyoglobin formation at 23°C. Even after 48 h at 5°C there was little evidence of oxymyoglobin formation in the chicken muscles although formation was evident in the pork samples. After only 24 h storage at 5°C it was apparent that both the chicken and pork muscles oxidised to produce some metmyoglobin at their surface. though hte amount produced was apparently more in the chicken than the pork samples. In most chicken samples held in air at 5°C the predominant pigments were the purple reduced myoglobin and brown metmyoglobin. The implication of these observations in relation to the packaging of chicken portions is discussed. AA

950

Correia (LR) and Mittal (GS). **Selection of fillers based on z_p values of meat emulsion properties during smokehouse cooking.** *International Journal of Food Science and Technology* 28(5); 1993; 443-451

Textural and functional properties of meat emulsions with various fillers were determined in the raw state, and when product-temp. reached 30, 40, 50, 60, 65 and 70°C during smokehouse cooking. The z_p (temp. interval needed to make a 10-fold change) values for several meat emulsion properties, namely moduli of elasticity, hardness, gel strength, and redness were obtained from the reciprocal of the slope of a linear regression of the logarithm of meat emulsion properties as a function of product-temp. Regression models of z_p values of meat emulsion elastic moduli, hardness (first bite) and gel strength were obtained as functions of cold or hot water absorption of filler. The selection of fillers was based on these regression models. AA

Beef

951

Strmiskova (G), Strmiska (F) and Dubravicky (J). **Mineral composition of mechanically deboned beef meat.** *Die Nahrung* 37(1); 1993; 94-96

952

Dickson (JS) and Frank (JF). **Bacterial starvation stress and contamination of beef.** *Food Microbiology* 10(3); 1993; 215-222

953

Reyes-Cano (R), Dorantes-Alvarez (L), Hernandez-Sanchez (H) and Gutierrz-Lopez (GF). **A traditional intermediate moisture meat: Beef cecina.** *Meat Science* 36(3); 1994; 365-370

954

Lefebure (N), Thibault (C), Charbonneau (R) and Piette (J-PG). **Improvement of shelf-life and wholesomeness of ground beef by irradiation. 2. Chemical analysis and sensory evaluation.** *Meat Science* 36(3); 1994; 371-380

Pork

955

Sen (NP), Baddoo (PA) and Seaman (SW). **Nitrosamines in crude pork products packaged in elastic rubber nettings. An update.** *Food Chemistry* 47(4); 1993; 387-390

N-nitrosamines are due to the interaction of nitrite additive in meat and amine additives in rubber that are used as accelerators in curing rubber. Out of 20 pork products analysed, one was negative, 6 contained 12-32 μg/kg levels of N-nitrosodibenzylamine (NDBZA) but no N-nitrosodi-n-butylamine (NDBA) and the others contained NDBA upto 48 μg/kg and NDBZA upto 520 μg/kg. SD

956

Buys (EM), Kruger (J) and Nortje (GL). **Centralised bulk pre-packaging of fresh pork retail cuts in various gas atmospheres.** *Meat Science* 36(3); 1994; 293-308

Products

Ham

957

Boerema (JA), Penney (N), Cummings (TL) and Bell (RG). **Carbon dioxide controlled atmosphere packaging of sliced ham.** *International Journal of Food Science and Technology* 28(5); 1993; 435-442

Commercially produced sliced, cooked, reformed ham in vacuum and CO_2 packs was stored at 10, 3 and -1.5°C. After various periods 3 vacuum and 3 CO_2 packs from each temp. were removed from storage and subjected to microbiological and sensory evaluation. Under mildly abusive chilled storage (10°C), the use of CO_2 in packs offered no advantage over vacuum in respect of retarding either microbial growth or the onset of unacceptable flavour changes. At chilled storage temp. (3 and -1.5°C), CO_2 packaging significantly extended the lag phase before microbial proliferation commenced, but did not extend the acceptable organoleptic life of the sliced ham beyond that attained using vacuum. The use of CO_2 controlled atm. packs cannot be advocated to replace the current use of vacuum packs for sliced, cooked, reformed ham, in terms of extending product storage life. AA

Sausages

958

Palumbo (SA), Smith (JL), Marmer (BS), Zaika (LL), Bhaduri (S), Turner-Jones (C), Williams (AC). **Thermal destruction of *Listeria monocytogenes* during liver sausage processing.** *Food Microbiology* 10(3); 1993; 243-247

Liver sausage emulsion was inoculated with *L. monocytogenes* Scott A to yield an initial population of c.10^9 g^{-1}. The inoculated emulsion was stuffed into large diam., moisture-proof fibrous casings and cooked. Individual sausages were removed as the product reached predetermined internal temp., and duplicate samples were analysed for viable *L. monocytogenes*. The viable count remained unchanged in product heated to 140°F. Product heated to 145°F showed decreased viable counts and at 155°F, no viable *L. monocytogenes* were detected. SRA

959

Rahkonen (S) and Kaitala (S). **The combined effect of cooking and storing temperatures on the quantities of aerobic, coliform and lactic acid bacteria in cooked sausage.** *Food Microbiology* 10(6); 1993; 501-506

A plate-type temp. gradient incubator was used to expose uncooked sausage emulsion to different combinations of cooking (9 levels in the range of 54-69°C) and cold storage (1-11°C) according to a g^2 factorial design. In general low bacterial counts corresponded with high cooking temp. and low storage temp. but overall pattern was not readily predictable. The bacterial counts were plotted against the corresponding cooking and cold storage temp. to give 3-dimensional (3D) maps. A 6-order polynomial model (PM) was fitted to the experimental data. The 3D maps can be used as a model to predict the probable number of bacteria in cooked and cold stored sausages with the help of a PM the combined effect of cooking and cold storage temp. on quantities of coliform and lactic acid bacteria was discovered. SRA

Poultry

960

Patterson (MF), Damoglou (AP) and Buick (RK). **Effect of irradiation dose and storage temperature on the growth of *Listeria monocytogenes* on poultry meat.** *Food Microbiology* 10(3); 1993; 197-203

Results of this study describes mathematically the growth of *L. monocytogenes* which have survived irradiation upto 2.5 kGy. The lag phase was most affected and increased significantly (2.5 - 18.5 days at temp. between 6-15°C) after irradiation dose of 2.5 kGy off-odours due to microbial activity were noticed after 10 days at 4°C, after 7 days at 10°C and after 1 day at 22°C. It was concluded that even if low numbers of *L. monocytogenes* were to survive the irradiation damage would be significant and some of these pathogens should not be a problem during the shelf-life of the poultry meat. SRA

961

Kijowski (J) and Mast (MG). **Tenderization of spent fowl drumsticks by marination in weak organic solutions.** *International Journal of Food Science and Technology* 28(4); 1993; 337-342

Drumsticks (DS) from spent layer hens marinated in 2% NaCl brine for 72 h to improve 'tenderness' as measured by shear-force, showed reduction of 40% of shear force of the meat. Marinating in 1.5% lactic or acetic acid ((LA)/(AA)) for 72 h reduced shear-force of the *M. gastrocnemius* by 21.7-fold and 8.1-fold, respectively to values comparable to those observed for broiler chicken DS meat. The presence of NaCl in LA or AA marinating sol. reduced the effect. Lower acid concn. (0.5%) in brine and the shorter time of marination (36 h) produced less change. Vacuum tumbling of DS in LA or AA with 2% NaCl for 2 h reduced the shear values of DS *M. gastrocnemius* by -50%, but longer periods had no further effect. Neutralization of the acidic taste of marinated DS meat with corresponding salts of the acids (1.5% sodium lactate or sodium acetate or sodium bicarbonate) reversed the change to an extent dependent on the type of salt used and change in pH level. AA

Chickens

Broilers

962

Xiong (YL), Pescatore (AJ), Cantor (AH), Blanchard (SP) and Straw (ML). **Influence of genetic strain, pH, and salts on cooking properties of processed light and dark broiler meat.** *International Journal of Food Science and Technology* 28(5); 1993; 429-434

The cooking yields of ground breast (light) and thigh (dark) meat of 8 genetic crosses of commercial strains were compared using different pre-cooking treatments. Adjustment of fresh meat pH from 6.0 - 6.1 to 6.4 with 0.5% phosphate increased ($P < 0.05$) the av. cooking yield of processed breast meat from 90 to 93%, and of thigh meat from 79 to 82%. Addition of 2.5% NaCl to the ground meat further improved the cooking yield. Most genetic crosses of broilers differed significantly ($P < 0.05$) in meat cooking yield, which changed similarly with pH and salt adjustments in most strains. Cooking yields of control, pH-adjusted and salt-added thigh meats were positively correlated with each other, but little correlation existed between thigh and breast meats. The results show the influence of genetic cross on meat cooking yield, and indicate the importance of controlling pH and salt content in broiler meat processing. AA

Turkeys

963

Schantz (R) and Bowers (J). **Response surfaces of sensory characteristics for reduced sodium chloride and phosphate salts in emulsified turkey sausages.** *Journal of Sensory Studies* 8(4); 1993; 283-300

Emulsified turkey sausages (ETS) were prepared using varying concn. of NaCl (1.5 - 2.0%), sodium tripolyphosphate (STPP, 0 - 0.5%), and sodium acid pyrophosphate (SAPP, 0 to 0.25%). The sensory characteristics (response variables) of saltiness, soapiness and texture were evaluated using a trained taste panel. Response surface methodology was used to design and analyze this study. Over the levels of STPP and SAPP, saltiness increased as levels of NaCl were increased. When STPP and SAPP were evaluated in combination with NaCl, saltiness increased slightly as levels of STPP were increased; and saltiness decreased as levels of SAPP were decreased. Soapiness increased at low levels of NaCl (1.5%) as STPP increased. Texture firmness decreased as SAPP increased and STPP decreased at low levels of NaCl (1.5%). Results suggest that sensory perceptions in ETS products are a combination of NaCl, SAPP and STPP mixtures. AA

SEAFOODS

Carp

964

Baker (J) and Abdullah (MY). **Changes in bighead carp (. *nobilis*) stored at ambient**

temperature. *ASEAN Food Journal* 8(4); 1993; 149-152

This paper examines the quality changes of bighead carp (*A. nobilis*) fish kept whole at 29-30°C, using chemical assessment and sensory evaluation over 24 h. Total volatile nitrogen (TNV) and thiobarbituric acid reactive substances (TBARS) values had a high linear correlation with storage time. pH changes were insignificant throughout the exp. Sensory evaluation indicated that the fish were acceptable only upto 12 h of storage with a corresponding TBARS value of 4.2 plus or minus 0.5 μmol mol/kg and TVN value of 5.32 mg N/100 g sample. SRA

Shrimps

965

Lin (CY) and Chiang (BH). **Desalting and recovery of flavour compounds from salted shrimp processing waste water by membrane processes.** *International Journal of Food Science and Technology* 28(5); 1993; 453-460

Diafiltration (DF) and electrodialysis (ED) were studied to remove salt and to recover flavour compounds from salted shrimp processing waste water. Using a loose reverse osmosis membrane, the DF process removed about 93% salt, but recovered < 50% of free amino acids and nucleotides. At high operation current density, the ED process removed 85% salt and recovered more than 70% of flavour compounds, and appeared to be a more effective method for recovering flavour compounds from the salted shrimp processing waste water. AA

Fish

966

Steiner-Asiedu (M), Lied (E), Lie (O), Nilsen (R) and Julshamn (K). **The nutritive value of sun-dried pelagic fish from the rift valley in Africa.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 439-443

The analysis of sun-dried pelagic fish of Africa revealed that they are good sources of protein, ash and fatty acids; poor in vitamins A and E; rich in docosahexaenoic acid and eicosapentanoic acid; low in thiamine and pyridoxine and high in niacin, Ca, Zn and Fe and amino acids. Hence its supplementation into weaning diet will meet the amino acid and protein needs of the child. GS

Catfish

967

Huang (Y-W) and Leung (C-K). **Microbiological assessment of channel catfish grown in cage and pond culture.** *Food Microbiology* 10(3); 1993; 187-195

Channel catfish (*Ictalurus punctatus*) grown in cage and pond culture were assessed for bacteria and also microbial changes in pre-packed fresh catfish during refrigerated storage (for 16 day at 4°C) were examined. Cage-raised (CRCF) and pond raised (PRCF) catfish skin surface rinse samples had no significant difference in their bacterial population except for the aeromond count ($P < 0.05$) significantly higher in CRCF. On both CRCF and PRCF bacterial counts were reduced by processing procedures. However, on the 8th day of cold storage both CRCF and PRCF packaged in vacuum bags had lower ($P < 0.05$) bacterial counts than catfish packaged with wrapping. SRA

Cod

968

Ofstad (R), Grahl-Madsen (E), Gundersen (B), Lauritzen (K), Solberg (T), Solberg (C). **Stability of cod (*Gadus morhua* L.) surimi processed with $CaCl_2$ and $MgCl_2$ added to the wash water.** *International Journal of Food Science and Technology* 28(5); 1993; 419-427

Washing cod mince in water containing both $CaCl_2$ and $MgCl_2$ improves the functional properties of the resultant surimi. Gel strength, frozen shelf-life, and colour, important quality factors for the further processing of surimi, were measured after different heat setting regimes for surimi pastes prepared with or without $CaCl_2$ and $MgCl_2$ addition. The surimi was stored frozen for up to 12 months. The positive effect of setting at low temp. was far more pronounced when the surimi was processed with 7.5 mM $CaCl_2$ and 15 mM $MgCl_2$ added to the wash water. After 12 months of frozen storage, the gel strength of the salt-washed surimi was reduced, but was still higher than the control. The lightness of the cooked surimi model product was reduced when salt-washed. The positive effect of the ions was abolished when lysine, an inhibitor of transglutaminase, was included. Hence, the positive effect of Ca^{2+} and Mg^{2+} ions on the functional properties of surimi may be caused by a transglutaminase-type enzyme present in cod mince. AA

Threadfin bream

969

Yean (YS). **The quality of surimi made from threadfin bream stored on ice for different periods.** *International Journal of Food Science and Technology* 28(4); 1993; 343-346

Surimi gels prepared from threadfin bream (TB) (*Nemipterus tolu*) stored on ice for up to 8 days showed no significant differences in protein, fat and moisture contents, but the yield decreased significantly after 2 days. Protein losses increased, but not significantly. Gel strength (hardness) was still acceptable after 2 days on ice, but then declined rapidly to unacceptable by 4 days on ice. TB should not be kept on ice for more than 2 days for production of surimi of acceptable quality. AA

Products

Surimi

970

Ohshima (T), Suzuki (T) and Koizumi (C). **New developments in surimi technology.** *Trends in Food Science and Technology* 4(6); 1993; 157-163

This review covers modern surimi processing (heading, gutting, deboning and mincing, washing, refining and dehydration and use of additives), glass transition during the freezing of surimi, waste water treatment by pH shifting, ultrafiltration and coagulation, new methods for the recovery of water-soluble proteins from the wash water and new fish sources for surimi production. 60 references. BV

PROTEIN FOODS

971

Schuchmann (H), Hogekamp (S) and Schubert (H). **Jet agglomeration processes for instant foods.** *Trends in Food Science and Technology* 4(6); 1993; 179-183

This paper gives a short overview of the basic principles and mechanisms underlying the jet agglomeration (JA) process based on studies at the author's pilot plant, and provides some general information on plant design. The advantages of JA over other agglomeration methods is also given. 7 references. BV

Infant foods

972

Paul (SC) and Mathur (BN). **Storage related changes in physico-chemical properties of lactose hydrolysed infant formula. A review: Paper II.** *Beverage and Food World* 21(2); 1994; 24-25

Changes in physico-chemical properties such as colour, flowability, reconstitutability, protein and fat profiles of spray-dried lactose hydrolysed infant formula during storage are reviewed in this article. 27 references. SRA

973

Gahlawat (P) and Sehgal (S). **Antinutritional content of developed weaning foods as affected by domestic processing.** *Food Chemistry* 47(4); 1993; 333-336

Four weaning foods viz (i) roasted wheat (70 g); roasted green gram (30 g) jaggery (25 g) (ii) malted wheat (70 g) malted green gram (30 g), jaggery (25 g); (iii) roasted barley (70 g), roasted green gram (30 g), jaggery (25 g); and (iv) malted barley (70 g), malted green gram (30 g), jaggery (25 g) were formulated and tested for the effect of domestic processing. Roasting of raw ingredients decreased 38.9 - 40.8% phytic acid; 44.8 - 48.6% saponin and 48.4 - 51.0% polyphenols. Malting decreased 56.6 - 57.6%

phytic acid; 53.9 - 57.7% saponin and 61.2 - 62.7% polyphenols. Malting lowered the antinutrients more than roasting. SD

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

974

Almela (L), Lazaro (I), Lopez-Roca (JM) and Fernandez-Lopez (Ja). **Tartaric acid in frozen musts and wines. Optimization of Rebelein's method and validation by HPLC.** *Food Chemistry* 47(4); 1993; 357-361

Rebelein's colorimetric method, to determine tartaric acid in thawed samples of frozen musts and wines, was modified by eliminating the activated carbon step and the results compared well with those obtained by cation-exchange HPLC. Precipitated tartrates in the freezing stage were dissolved by acidification to pH 1.0 before colour reaction development or HPLC analysis. SD

975

Drdak (M), Rajniakova (A), Buchtova (V) and Simko (P). **Free amino acid content of various red wines.** *Die Nahrung* 37(1); 1993; 77-78

976

Waters (EJ), Wallace (W), Tate (ME) and Williams (PJ). **Isolation and partial characterization of a natural haze protective factor from wine.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 724-730

This study describes the isolation of haze protective polysaccharide fraction and investigates its properties and the mechanism of its action in decreasing visible haze. Recognition of the presence and the properties of this natural polysaccharide fraction as a haze protective factor (HPF) opens up a totally new method for avoiding protein haze spoilage in winemaking. BV

Non-alcoholic beverages

Coffee

977

Elmore (JS) and Nursten (HE). **The effect of 2-furanmethanethiol upon the flavour of instant coffee.** *International Journal of Food Science and Technology* 28(5); 1993; 531-536

2-Furanmethanethiol (furfuryl mercaptan) is a constituent of the aroma of roasted coffee and the isolated compound has been reported to possess the aroma of fresh roasted coffee. Because instant coffee is less flavoursome than fresh roasted coffee, a series of concn. of 2-furanmethanethiol were added to instant coffee, in order to determine if it would have a desirable effect upon the flavour of the coffee. At no concn. was there a preference for the coffee containing added 2-furanmethanethiol. At concn. of added thiol above 100 parts per 10^9 (100 p.p.b.), in both black and whitened coffee, there was a significant preference noted for the reference sample, which contained no added thiol. The three most used descriptors for the aroma of 2-furanmethanethiol were burnt, then sulphurous, then coffee-like. AA

Fruit juices

Apple juices

978

Deak (T) and Beuchat (LR). **Evaluation of the indirect conductance method for the detection of yeast in laboratory media and apple juice.** *Food Microbiology* 10(3); 1993; 255-262

The technique of indirect conductimetry (IC) was examined to assess growth of 7 yeast species (*Candida glabrata*, *C. parapsilosis*, *Debaryomyces hansenii*, *Pichia membranaefaciens*, *Rhodotorula glutinis*, *Saccharomyces cerevisiae*, *Zygosaccharomyces bailii*) in terms of detection time, max. rate of change in conductance and max. change in conductance in lab. media and apple juice. Results indicate that the indirect method (IM) of measuring conductance has good potential as a technique to detect yeast activity and growth. Compared to direct conductimetry, IM gives an increased and more rapid conductance change. The method can be applied under a wide range of environmental conditions and does not require a defined medium to enhance conductivity. IC appears to be a promising technique for rapid detection of yeasts in foods and this method can detect yeast populations as low as 10^1 cfu ml^{-} within 48 h at 30°C. AA

Litchi

979

Singh (P) and Singh (IS). **Physico-chemical changes during storage of litchi (*Litchi chinensis*) beverages.** *Indian Journal of Agricultural Sciences* 64(3); 1994; 168-170

Pasteurized ready-to-serve drink (i) pasteurized nectar, (ii) and 0.06% potassium metabisulphite added squash (iii) prepared from litchi were stored for 4 months at room temp. Sensory quality and chemical analysis revealed that (i) and (ii) were acceptable upto 3 months and (iii) upto 4 months. Total soluble solids and total acidity increased in storage, colour turned brown and slightly dark and off-flavour noticed. KAR

Orange juice

980

Shaw (PE), Buslig (BS) and Moshonas (MG). **Classification of commercial orange juice types by pattern recognition involving volatile constituents quantified by gas chromatography.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 809-813

Four types of commercial orange juices were compared by use of a multivariate computer pattern recognition program as either fresh squeezed, pasteurized not from concentrate, single-strength juice reconstituted from concentrate, or aseptically packaged single-strength juice from concentrate. 19 volatile constituents of each juice were quantified by headspace GC for these multivariate analyses. Elimination of 1 and 5 components considered least important generally led to poorer classification. The mean value and range of values quantified for each component in each juice classification are tabulated. AA

Orange juices

981

Thakur (BR) and Arya (SS). **Effect of sorbic acid on irradiation-induced sensory and chemical changes in sweetened orange juice and mango pulp.** *International Journal of Food Science and Technology* 28(4); 1993; 371-376

Gamma-irradiation (10 KGy) of pasteurized orange juice and both blanched and unblanched mango pulp produced off-flavours rendering them unacceptable, and enhanced browning during storage. Sorbic acid (0.1%) completely inhibited the off-flavours and reduced the rate of browning; it also reduced losses in ascorbic acid during irradiation and storage of sweetened orange juice. In mango pulp, sorbic acid did not prevent ascorbic acid loss on irradiation, but did reduce storage losses. Irradiation and storage losses in carotenoids were slight and not influenced by sorbic acid. The pH and acidity of sweetened orange juice and blanched mango pulp did not change on irradiation or storage, but in unblanched pulp acidity increased and pH decreased on storage. Radiolytic degradation of sorbic acid was higher in blanched than unblanched mango pulp; both were more than in orange juice. AA

Soy beverages

982

Singh (N), Singh (D), Chauhan (GS) and Suresh (I). **Some physico-chemical and sensory characteristics of beverage developed from defatted soyflour.** *Beverage and Food World* 21(2); 1994; 18-19

Results showed that the protein content was higher in protein isolate whereas minerals except Na and vitamins were higher in defatted soy flour, indicating the loss of these nutrients during isolation of protein. The soy protein beverage added with milk, cream and groundnut oil did not differ significantly (P -0.05) from each other with respect to their acceptability. It is concluded that an acceptable nutritious beverage can be developed from defatted soy flour if used in the form of wet protein isolate. Addition of 8% sugar and 0.05% salt made the product more acceptable. SRA

Tea

983

Price (NE) and Spitzer (JC). **Variations in the amounts of individual flavanols in a range of green teas.** *Food Chemistry* 47(3); 1993; 271-276

Nine green tea from China and Japan were analysed. Epi-gallocatechin (EGC) was the most prevalent flavanol but not epi-gallocatechin gallate (EGCG) as previously reported. Equilibrium behaviour of extraction of flavanols and caffeine into aqueous media at 80 and 60°C for Sencha Uji Tsuyu tea indicated that extraction efficiencies are similar to that for extraction of soluble components from black teas. The results confirmed that EGC was the flavanol with highest concn. making it relevant to the current interest in tea flavanols as antimutagenic agents in the treatment of cancer. From the correlation obtained between flavanol and price of tea, price of green teas at auction could be predicted from flavanol content. SD

984

Opie (SC), Clifford (MN) and Robertson (A). **The role of (-)-epicatechin and polyphenol oxidase in the coupled oxidative breakdown of theaflavins.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 435-438

An enzymic in-vitro model tea fermentation system has been used in combination with gradient elution reversed-phase HPLC to study the oxidative breakdown of black tea theaflavins in the presence and absence of (-)-epicatechin. It was found that theaflavin, theaflavin-3-monogallate, theaflavin-3'-monogallate and theaflavin-3,3'-digallate were not substrates for tea polyphenol oxidase (EC 1.14.18.1) whereas (-)-epicatechin alone, or mixtures of (-)-epicatechin and a theaflavin were rapidly converted to a complex mixture of therubigin-like substances. While the chromatographic profiles varied with the identity of the theaflavin precursor each resembled the equivalent profile obtained with a whole black tea liquor. It is concluded that theaflavins are degraded by a coupled oxidation with (-)-epicatechin quinone. It is suggested that thearubigins may form via these pathways during black tea manufacture. AA

985

Bailey (RG), Nursteu (HE) and McDowell (I). **The chemical oxidation of catechins and other phenolics: A study of the formation of black tea pigments.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 455-464

The chemical oxidation of polyphenols has been used to produce black tea pigments. (+)-Catechin, (-)-epicatechin, (-) epicatechin gallate and (-)-epigallocatechin gallate were isolated from convenient sources, their identity being confirmed by MC and HPLC. The oxidation of a mixture of (-)-epicatechin gallate and gallic acid gave an oxidation product of (-)-epicatechin gallate in addition to epitheaflavic acid 3-gallate. The catechins were oxidised chemically and the products analysed by HPLC, the chromatograms being compared with a black tea chromatogram. The reactions gave both resolved and unresolved pigments, and many of the resolved pigments had HPLC retention time close to black tea pigments. Each catechin behaved differently, the chromatograms of the oxidation products from each starting material being clearly distinguishable. Resolved pigments were obtained by the chemical oxidation of other phenolic compounds. This work provides a convenient method for studying the formation of resolved and unresolved black tea pigments. AA

986

Paul (S), Sharma (DK), Sharma (KL) and Misra (SK). **Genetic variability for yield and quality in tea (*Camellia sinensis*) clones.** *Indian Journal of Agricultural Sciences* 64(5); 1994; 314-319

Among the 6 clones of tea (TV 9, TV 18, TV 23, Phoobsering 312, Tukdah 253 and Kangra Local) yield showed max. variability and amino acid N, caffeine N and brightness % showed max. variability. Theaflavin was significantly positively correlated with total colour and brightness %. Total colour was positively correlated with brightness % and thearubigins. TV 23 was the highest yielder, followed by Phoobsering 312, TV 9 and Tukdah 253. Theaflavin content and brightness of made-tea was excellent with TV 23 and Tukdah 253. All these clones are recommended for growing under Kangra valley, India and for breeding to improve yield and quality. KAR

Whey-based fruit beverages

987

Vojnovic (V), Ritz (M) and Vahcic (N). **Sensory evaluation of whey-based fruit beverages.** *Die Nahrung* 37(3); 1993; 246-251

In this article sensoric evaluation of some whey-based fruit beverages is presented for samples from pasteurized whey permeate and 5 kinds of fruit juices at 20-40% with the addition of some corrigens (sucrose and ascorbic acid at 7 and 10% and 0.2 and 0.4% respectively). Sensory evaluation was carried out be assessors (panel's groups of 5 experts) using scoring system (20-point scale) an weighted factors. The results of investigation showed good sensoric quality of prepared whey beverages and the fact that the permeate obtained as a by-product during cheesemaking can be successfully used to produce permeate-based beverages. BV

FATS AND OILS

Oils

988

Kourmiska (L), Pokorny (J) and Tirzitis (G). **The antioxidant activity of 2,6-dimethyl-3,5-diethoxycarbonyl-1,4-dihydropyridine in edible oils.** *Die Nahrung* 37(1); 1993; 91-93

989

Ledahudec (J) and Pokorny (J). **Effect of nonvolatile oxidation products on sensory characteristics of frying oils.** *Die Nahrung* 37(1); 1993; 97-98

Olive oil

990

Nergiz (C). **The effect of refining processes on the total polyphenol and 1,2-diphenol content of olive oil.** *International Journal of Food Science and Technology* 28(5); 1993; 461-464

The effect of commercial olive oil refining processes on the total polyphenol and 1,2-diphenol content of the oil was investigated. The mean losses of total polyphenols and 1,2-diphenols of the crude oils were 84-87% and 79-88% respectively. There was no difference between the chemical and physical refining processes in reducing phenols in the oil samples. AA

Palm oils

991

Graille (J), Pina (M), Montet (D), Ratomahenina (R), Minier (C), Galzy (P). **Organoleptic study of alimentary pasta enriched with palm oil-based yeast foods.** *Oleagineux* 48(8-9); 1993; 373-376

After optimization of the production of single cell proteins using *Candida rugosa* cultures from crude palm oil used as carbonated substrate, these yeast foods were added at the rates of 3, 7 and 10% into experimental alimentary pasta of hard wheat semolina to enhance the proteic density of the basic product.. The hedonistic appreciation test shows that the acceptability decreases with yeast enhancement rate. The descriptive test results give good utterance to this appreciation. However, the process simplicity and the nutritional qualities of the yeasts obtained make this study a project applicable to most countries with deficient protein diet. AA

992

Manorama (R), Chinnasamy (N) and Rukmini (C). **Effect of red palm oil on some hepatic drug-metabolizing enzymes in rats.** *Food and Chemical Toxicology* 31(8); 1993; 581-588

Soybean oils

993

Bhandari (S) and Chandra (S). **Synthesis, characterization and evaluation of chlorinated soybean oil alkyds.** *Indian Journal of Chemical Technology* 1(1); 1994; 45-52

Five samples of chlorinated alkyds (CA), varying in the chlorine content (11.8 - 50.8%) were synthesized to study the effect of chlorine using IR spectroscopy. Study confirmed that chlorine enters only into the aliphatic portion of the alkyd molecule by addition and substitution reactions. Thermal stability of the CA was found to increase with the chlorine content. In general the chlorinated soybean alkyds possessed superior film forming properties as compared to unchlorinated ones except in terms of flexibility and solvent resistance. SRA

994

Miyahara (M) and Saito (Y). **Pesticide removal efficiencies of soybean oil refining processes.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 731-734

Soybeans, soybean flakes, crude oil (CO), alkali-refined oil (ARO), and bleached oil were spiked with 4 kinds of pesticides (dichlorvos, malathion, chlorpyrifos, and captan) and were subjected to roasting, extraction, alkali refining, bleaching and deodorizing under lab. conditions. The pesticide levels in the products and the byproducts were determined immediately after processing. The results indicate: (1) the dichlorvos in the dry soybeans and the oils is decreased markedly at each stage of processing. Malathion in CO and ARO is reduced at the alkali-refining stage. (2) the 4 pesticides were removed or eliminated completely by deodorizing at temp. usually used in commercial practice. BV

SPICES AND CONDIMENTS

995

Suderman (DR). **Selecting flavourings and seasonings for batter and breading systems.** *Cereal Foods World* 38(9); 1993; 689-694

This article reviews the factors (types of batters and breadings, breading characteristics, batter characteristics, substrate characteristics) to be considered in developing batters and breadings and discusses incorporating flavourings (spices, herbs, liquid or spice extractives, artificial flavours) and seasonings into batter/breading systems. CSA

Lemon oils

996

Pino (J), Sanchez (M) and Roncal (E). **Preparation and chemical composition of lemon oil concentrates.** *Die Nahrung* 37(3); 1993; 277-279

Preparation of flavour concentrates from cold-pressed lemon oil by vacuum distillation and to determine the qualitative and quantitative composition of these prepared oils by capillary GLC is presented. BV

Chillies

997

Singh (H), Kaur (S) and Singh (J). **Determination of infection in fruit rot (*Colletotrichum capsici*) of chilli (*Capsicum annuum*).** *Indian Journal of Agricultural Sciences* 63(5); 1993; 310-312

Fruit rot disease in 20 var. of chilli (*C. annuum*) caused by *Coll. capsici* was studied by pin-prick method and the extent of disease resistance determined. The degree of fruit rot was judged by visual observation, and scored on 0-4 scale. Up to the stage of infection, var. did not show difference but at the sporulation stage the susceptible and resistant var. showed the difference. The sporulation in susceptible var. started within 4-5 days of inoculation and reached max. in 7-8 days whereas in resistant var. it started during 4-6 days after inoculation. In susceptible var. the lesions were large with heavy sporulation, and in resistant var. they were small with sparse sporulation. KAR

Coriander

998

Kerrola (K) and Kallio (H). **Volatile compounds and odor characteristics of carbon dioxide extracts of coriander (*Coriandrum sativum* L.) fruits.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 785-790

Volatile components of coriander fruits were isolated by supercritical carbon dioxide (SC-CO_2) extraction at 9 MPa/40°C and analyzed using GC-MS. The composition of SC-CO_2 extract resembled the conventional isolates in the relative amounts of monoterpene hydrocarbons. The oxygenated monoterpernes comprised 80% of the SC-CO_2 and 82% of the LCO_2 extract, linalool being the main compound (67%) in both extracts. The sensory characteristics of the aroma of CO_2 extracts were evaluated and compared with those of freshly ground spice. No major differences in the average intensities of any odour attribute could be found between the coriander fruits harvested in 1990 and 1991. The SC-CO_2 extract was evaluated to be more terpenous and less sweet than the reference (coriander 1990). The assessors described the supercritical extract as the most terpenic and spiciest with some pungency. The aroma of LCO_2 extract was characterized as distinctly pomerance like and sweet, although all odor attributes were evaluated to be less intense than those in freshly ground coriander fruits. AA

Garlic

999

Yan (X), Wang (Z) and Barlow (P). **Quantitative determination and profiling of total sulphur compounds in garlic health products using a simple GC procedure.** *Food Chemistry* 47(3); 1993; 289-294

Main S compounds in garlic viz alliin, allicin, sulphides and the total S compounds could be determined. The procedure is simple and showed nearly 100% recovery when pure alliin and garlic oil sulphides were used. It can also be used to compare the composition of different product formulations. SD

1000

Yu (T-H), Wu (C-M) and Ho (C-H). **Volatile compounds of deep-oil fried, microwave-heated, and oven-baked garlic slices.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 800-805

Fried, oil-cooked, microwave-fried, baked and microwaved-baked garlic samples (GS) were prepared in this study. The volatile compounds in these GS were analysed by using GC and GC-MS. A total of 41 volatile compounds were identified from these GS. Among these volatile components, diallyl disulphide (DS) and diallyl trisulphide (DTS) were the dominant compounds found in baked or microwave-baked GS. DS, methyl allyl disulphide, and vinyldithiins were the dominant compounds found in fried, oil-cooked, and microwave-fried GS. Oil treatments of garlic favoured the formation of vinyldithiins, and the content of DTS in oil-treated GS was very low. Significant amounts of nitrogen-containing volatile compounds were found in baked or oil-treated GS. These N-containing compounds were mainly generated from the interactions of reducing sugars and flavour precursors of garlic. BV

SENSORY EVALUATION

1001

Moskowitz (H) and Krieger (B). **What sensory characteristics drive product quality ? An assessment of individual differences.** *Journal of Sensory Studies* 8(4); 1993; 271-282

Twenty one fruit pies were evaluated by 98 consumers in the age range of 21-54 yrs. The consumer's overall liking rating is regressed against individual attributes liking. The coefficient M of the linear equation overall liking = M (Attribute liking) + B reflects the relative importance of the individual sensory attribute to the overall quality. SD

1002

Berglund (PT), Lau (KN) and Holm (ET). **Improvement of triangle test data by use of incentives.** *Journal of Sensory Studies* 8(4); 1993; 301-316

77 panelists participated in double triangle test and the economic incentive test with cereal product and 60 panelists performed both the tests with reconstituted drink mix. First the panelists' ability to detect differences was determined and they were distributed according to the same for incentives. The economic incentive test was more effective and discouraged the panelists from guessing and increased the motivation to detect differences. SD

1003

Dijksterhuis (GB). **Principal component analysis of time-intensity bitterness curves.** *Journal of Sensory Studies* 8(4); 1993; 317-328

Time-intensity (TI) curves for one particular object, say bitterness are prone to large individual differences. As an alternative to overcome this problem, a principal component analysis on the matrices of objects by individual TI-curves for each object is performed known as Principal Time Intensity Curves (PTIC). SD

1004

Ennis (DM). **The power of sensory discrimination methods.** *Journal of Sensory Studies* 8(4); 1993; 353-370

The power of a test is defined as the probability that if a specified difference exists it will be demonstrated as a significant difference in the test. A general equation for the power and sample size for discrimination methods - 2 alternative force choice, 3 alternative forced choice, duo-trio and triangular methods is given. Also tables of the psychometric functions for these methods are given. SD

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1005

Kaneda (M), Hatakenaka (N), Teramoto (S) and Maita (K). **A two-generation reproduction study in rats with methyl bromide-fumigated diets.** *Food and Chemical Toxicology* 31(8); 1993; 533-542

Crj:CD(SD) rats were fed basal (control) diet or methyl bromide (MB) fumigated diet containing 80, 200 or 500 p.p.m. total bromine for 2 successive generations (18 wk for each generation). Compared with controls, food consumption was significantly lower in F_1 parental females of the 500-p.p.m. group during the second half of the dosing period, and F_2 female pups of the 500-p.p.m. group showed lower body wt. throughout the lactation period. No other treatment-related changes were found at any dietary level of total bromide in either parental animals (F_0, F_1) or their offspring (F_1, F_2) for any of the parameters studied (i.e. clinical signs, oestrous cycle, sperm count and morphology, mating, fertility, gestation, parturition, litter size, pup viability, organ wt., and gross or histopathological examination). It was concluded that residues of 200 and 500 p.p.m. total bromine in diets fumigated with MB are the no-observed-effect level and the min toxic level, respectively, for both parental rats and their offspring, and the bromine residues do not affect reproductive performance at dietary levels of up to 500 p.p.m. AA

BIOCHEMISTRY AND NUTRITION

1006

Manas (E) and Saura-Calixto (F). **Ethanolic precipitation. A source of error in dietary fibre determination.** *Food Chemistry* 47(4); 1993; 351-355

Error sources, non-fibre component co-precipitation and incomplete precipitation of soluble dietary fibre (SDF) were studied. Citrus pectins and pectin-organic acid (citric and oxalic) mixtures were dissolved in phosphate buffer and precipitated in 78% ethanol at different pH values. Incomplete recovery of pectins (84 - 89% based on pH of the sol.) and significant co-precipitation of organic acids were observed. SDF values determined in fruits, legumes and cereals by dialysis were higher than the values obtained by precipitation technique. Present analytical methods show incomplete detn. of SDF. Also gravimetric methods can include a fraction of non-fibre constituents such as organic acids as fibre. SD

1007

Mathews (S), Singhal (RS) and Kulkarni (PR). **Ocimum basilicum. A new non-conventional source of fibre.** *Food Chemistry* 47(4); 1993; 399-401

Ocimum seeds contain a reasonable amount of hemicellulose and cellulose, accounting for their hydrophilic character. They are high in fibre and associated nutritional properties, and can be considered as a new non-conventional source of fibre. AA

1008

Ozierenski (B), Plass (R) and Lewerenz (H-J). **Effects of glucosinolate breakdown products on the hepatic biotransformation system in male rats.** *Die Nahrung* 37(1); 1993; 5-14

The effect of 5-vinyloxazolidine-2-thione (VOT), 1-cyano-3-butene (CYB) and various isothiocyanates on parameters of hepatic phase I and II biotransformation were investigated in male rats after oral treatment for 3 consecutive days. The compounds (except CYB) caused increase in liver wt. and glutathion S-transferase activity. Cytochrom P-450 level and monooxygenase activities were decreased by the isothiocyanates and CYB. Administration of VOT resulted in contrasting response of monooxygenases; reduced aminopyrine N-demethylation and enhanced aniline hydroxylation. Possible mechanisms are discussed. AA

1009

Heredia (A), Ruiz-Guthierrez (V), Felizon (B), Guillen (R), Jimenez (A), Fernandez-Bolanos (J). **Apparent digestibility of dietary fibre and other components in table olives.** *Die Nahrung* 37(3); 1993; 226-233

The apparent digestibility of the main components of the olive (*Olea europaea arolensis*) has been studied using young Wistar rats. An appreciable digestibility of fibre was found (of the order of 31% Neutral Detergent Fibre) and a high digestibility of fats (higher than 60%) and sugars (100% of glucose and 76% of fructose). Some 41% of the protein was digested, a relatively low value when compared with other products. If the diet is previously desalted, the digestibility of the components diminishes. There are significant differences in the digestibility of dry matter, fibre, cellulose and lignin, but not in proteins and fat. AA

TOXICOLOGY

1010

Kahl (R) and Kappus (H). **Toxicology of the synthetic antoxidants BHA and BHT in comparison with the natural antioxidant vitamin E.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 329-338 (De)

The toxicology of the food preservatives BHA and BHT as well as the naturally occurring vitamin E (α-tocopherol) is described. In high dosages all 3 compounds induce in animals impairment of blood clotting, which can be explained by an antogonism with vitamin K. Specific toxic effects to the lung have only been observed with BHT. The other described toxic effects of BHA and BHT are less characteristic and often occur only after high dosage and long-term treatment. However, BHA induces in animals tumors of the forestomach, which are dose dependent, whereas BHT induces liver tumors in long-term experiments. Because there is no indication of genotoxicity of BHA and BHT, all published findings agree with the fact that BHA and BHT are tumor promoters. In contrast to BHA and BHT, vitamin E is not carcinogenic. On the other hand, all 3 antioxidants have also anticarcinogenic properties. The intake of the necessary high doses as for these effects are, however, contraindicated with BHA and BHT because of their carcinogenic effects. The present overview concludes that the concn. of BHA and BHT nowadays used in food, drugs and cosmetics are probably harmless. In addition, vitamin E can also be used in higher doses without the occurrence of adverse effects. AA

1011

Ehlermann (DAE). **Control of food irradiation: A challenge to authorities.** *Trends in Food Science and Technology* 4(6): 1993; 184-189

The need for a more qualitative approach to the inspection of irradiated foods by authorites worldwide is stressed so that the irradiated on a food product will become more meaningful to the consumers. Irradiation regulations in European community member states are compared with international standards. The self controlling nature of radiation processing, radiation quantities used in process control, radiation quantities suitable for official monitoring are discussed. GS

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GENERAL

1012

Shi (Z), Daun (H) and Francis (FJ). **Major anthocyanin from *Tradescantia pallida*: Identification by LSI-MS and chemical analyses.** *Journal of Food Science* 58(5); 1993; 1068-1069

The structure of the main anthocyanin a potential food colorant from *Tr. pallida* was identified by liquid secondary ion MS (LSI-MS) and HPLC as cyanidin-3,7,3-1-triglucoside with 3 molecules of ferulic acid, 1 molecule of caffeic acid and 1 terminal glucose. AA

1013

Fabre (CE), Santerre (AL), Loret (MO), Baberian (R), Pareilleux (A), Goma (G), Blanc (PJ). **Production and food applications of the red pigments of *Monascus ruber*.** *Journal of Food Science* 58(5); 1993; 1099-1102, 1110

Properties of red pigments secreted by *Monascus ruber* in submerged culture were studied, using ethanol and glutamate as C and N sources. After extraction and purification, the colorants were suspended in water for evaluation. Stability of the extract was tested both in sol. and when incorporated into meat products (sausage and pate). Pigments added to sausage or pate remained stable when stored for 3 months at 4°C; stability was between 92 and 98%. Sensory evaluation revealed that *Monascus* pigments could serve as a suitable traditional food additives such as nitrite salts or cochineal. SRA

1014

Gelardi (RC). **Charting the worldwide lite marketplace.** *Manfacturing Confectioner* 73(5); 1993; 41-45

1015

Buisson (DH). **The Asia Pacific food market opportunities and challenges.** *Manfacturing Confectioner* 73(2); 1993; 39-40, 42-44

Major economic and social changes taking place in the Asia Pacific rim countries in relation to their impact on the food industry and on future food marketing opportunities for Western countries are discussed. These trends include: increased urbanization and the resulting demand for convenience foods; changes in the typical Asian diet (more westernized tastes); emphasis on health; and changing trade restrictions. CSA

1016

Valverde (ME) and Paredes (L-O). **Production and evaluation of some food properties of huitlacoche (*Ustilago maydis*).** *Food Biotechnology* 7(3); 1993; 207-219

Huitlacoche (a Mexican edible delicacy, comprising the smut gall caused by the fungus *Ustilago maydis* growing on corn ears); are prepared and consumed in a similar manner to common mushrooms. Studies were conducted on composition of 3 samples of *huitlacoche*; naturally-occurring samples from the Toluca and Pachuca areas of Mexico and a sample prepared by inoculation of corn ears with *U. maydis*. Data are given for proximate composition, amino acid composition and fatty acid composition; samples were also tested for mycotoxins. No sample contained aflatoxins, ochratoxins or zearalenone. Moisture content ranged from 91.6 to 93.2 g/100 g fresh wt. basis. Mean values for proximate composition were (g/100 g DM basis): crude protein 11.5-14.1; true protein 9.7-12.4; fat 1.6-2.3; ash 5.2-7.0; crude fibre 16.0-23.5; and carbohydrates (by difference) 55.1-66.5. Lysine content was relatively high (6.3-7.3 g/100 g protein). The predominant fatty acids were linoleic acid (38.7-48.4%), linolenic acid (38.7-48.4%), linolenic acid (13.0-14.6%). Differences in composition between samples from the 3 sources studied are considered. BV

FOOD PROCESSING

1017

Kim (H-J) and Taub (IA). **Intrinsic chemical markers for aseptic processing of particulate foods.** *Food Technology* 47(1); 1993; 91-97, 99

The compounds intrinsically produced from foods upon thermal processing are useful for validating the sterility of aseptically processed particulate foods is described in this article. CSA

FOOD PACKAGING

Packaging materials

1018

Srivastava (MK) and Chopra (S). **Good quality polyethylene prerequisite for the performance of drop-test.** *Indian Dairyman* 46(5); 1994; 251-254

Drop test is simple, convenient, easy and practical to judge the quality of polyethylene film and also seal strength to be ascertained for better storage and transportation. Pouches made from the polyethylene having uniform thickness and tensile strength and enlongation break % as per BIS norms and filled with milk performed good in drop-test. GS

FOOD ENGINEERING AND EQUIPMENT

1019

Chen (SD), Ofoli (RY), Scott (EP) and Asmussen (J). **Volatile retention in microwave freeze-dried model foods.** *Journal of Food Science* 58(5); 1993; 1157-1161

Microwave freeze-drying required shorter drying times and leads to higher volatile retention levels than conventional freeze-drying. Pregelatinized corn starch solutions (8% solids) were mixed with 500 p.p.m. each of 1-hexanol, 1-decanol and D-limonene and subjected to 3 treatments: control, addition of 4% β-cyclodextrin and addition of 4% sucrose. Samples were frozen at -15, -60 or -198°C and freeze-dried at a microwave power of 10 W and a cavity pressure of 1 or 2 torr. Results showed that sample composition significantly affected both drying rate and volatiles retention. Samples containing β-cyclodextrin had higher levels of volatile retention than other treatments, probably due to inclusion complex formation and shorter drying times. Samples frozen at -15°C had higher levels of volatile retention. Freeze-drying of samples at 1 torr resulted in higher final moisture contents than at 2 torr, but no appreciable differences in volatiles. SRA

Equipments

1020

Anon. **The Buhler continuous fresh air roaster, type STT.** *Confectionery Production* 59(3); 1993; 198-199

Discusses the use of Buhler continuous fresh air roaster type STT for uniform roasting of cocoa beans, nibs and nuts. Aspects considered are: products treated by the Buhler STT roaster; gentle handling of the product; regularity of roast; hygienic design and easy maintenance; exact process control; energy conservation; and use of heating media (other than steam). CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1021

Chinachoti (P). **Water mobility and its relation to functionality of sucrose - containing food systems.** *Food Technology* 47(1); 1993; 134-140

The article provides a review of the current understanding of the complex behaviour of water in solute-polymer systems from various physicochemical studies such as water mobility and phase transition. The physical state of sucrose affects the mobility of water in a food system and thus affects the properties of the system and the potential for food spoilage. 69 references. CSA

1022

Kocher (PN) and Foegeding (EA). **Microcentrifuge-based method for measuring water-holding of protein gels.**

Journal of Food Science 58(5); 1993; 1040-1046

Reports a method developed to measure water-holding properties of protein gels which provided high precision and expanded analysis. A cylindrical gel sample was placed in an inner cell (which at its base contained a filter membrane) of a commercial microfiltration unit. The unit was then spun in a horizontal rotor microcentrifuge. Rates of water loss and degree of compression were determined. The rate of water loss could be modelled as the summation of 2 exponential decay functions. Degree of compression correlated with held-water. Gel rehydration ability and microstructure were used to study effects of centrifugal compression on gel structure. SRA

1023

Hayakawa (I), Yamada (Y) and Fujio (Y). **Microparticulation by jet mill grinding of protein powders and effects on hydrophobicity.** *Journal of Food Science* 58(5); 1993; 1026-1029

A method for microparticulation of protein for use as fat substitutes by superfine grinding (SG) was studied and hydrophobicity of the microparticulated proteins was evaluated. A stainless steel jet mill equipped with 6 jet nozzles was used for SG. The mill was operated at 7.0 kgf/cm^2 G air pressure and 7.5 Nm^{3}min air vol. at room temp. Egg white (EW) was ground once at a feed rate of 0.92 kg/h. Casein was ground twice at 1.142 and 0.96 kg/h and Soybean hull (SH) was ground twice at 0.80 and 0.45 kg/h. The mill produced particles less than 3 μm from EW, casein and SH. Microparticulation by grinding of EW was easier than with casein or SH. Hydrophobicity of casein increased by grinding to superfine particles but no significant effect was observed on SH or EW. BV

1024

McClements (DJ), Dungan (SR), German (JB), Simoneau (C) and Kinsella (JE). **Droplet size and emulsifier type affect crystallization and melting of hydrocarbon-in-water emulsions.** *Journal of Food Science* 58(5); 1993; 1148-1151, 1178

Effects of emulsifiers and droplet size on phase behaviour of oil droplets stabilized by small surfactants and milk proteins were examined. DSC was used to monitor crystallization and melting of 20 wt.% n-hexadecane oil-in-water emulsions. The temp. at which droplet crystallization occurred depended on type of emulsifier used to stabilize the droplets: sodium caseinate, whey protein isolate, Tween 20, 40, 60 and 80 or SDS. Emulsifiers with hydrocarbon tails close in structure to n-hexadecane promoted crystallization at higher temp., which suggested that emulsifier molecules at the interface acted as nucleation sites for oil. Smaller droplets crystallized at a slower rate than larger droplets. Droplet size and emulsifier type had no appreciable effect on melting behaviour of the droplets. SRA

1025

Barletta (BJ) and Barbosa Canovas (-GV). **Fractal analysis to characterize ruggedness changes in tapped agglomerated food powders.** *Journal of Food Science* 58(5); 1993; 1030-1035, 1046

Samples of commercial instant coffee and instant skim milk powders were exposed to attrition in a tap density tester. Digital images of the projected outlines of individual particles were obtained and the fractal dimension of their profiles was computed with 3 different algorithms. Results show that the mean apparent practical value of the agglomerates varied with the number of tappings. SRA

1026

Bakhit (R) and Schmidt (S). **Sorption behavior of mechanically mixed and freeze-dried sucrose/casein mixtures.** *Journal of Food Science* 58(5); 1993; 1162-1165

Interactions between sucrose and casein were investigated by adsorption isotherms. Mechanically mixed and freeze-dried sucrose/casein mixtures at sucrose 1, 5, 10, 15 and 20% (wet basis) were compared to calculated isotherms using the mass balance equation, over the a_W range 0.23-0.93 at 20°C. Mechanical mixtures did not exhibit solute/polymer interactions. Freeze-dried systems showed positive interaction (i.e. sorbed more water than calculated) for 1 and 5%

sucrose at all a_w values. For the 10, 15 and 20% sucrose mixtures, positive interaction continued below 0.86 a_w; however, above 0.86 a_w, no interaction was apparent, i.e. experimental sorption values equalled calculated values. BV

1027

Arteaga (GE) and Nakai (S). **Predicting protein functionality with artificial neural networks: foaming and emulsifying properties.** *Journal of Food Science* 58(5); 1993; 1152-1156

Using physicochemical properties of ribonuclease-A, ovomucoid, trypsin, lysozyme, pepsin, conalbumin, ovalbumin, bovine serum albumin, kappa-casein, beta-lactoglobulin and beta-casein, artificial neural networks (ANN) were developed for predicting foam capacity (FC) and stability (FS) and emulsion activity index. Prediction accuracy of ANN was compared to that of principal component regression (PCR) models. ANN had better prediction ability than PCR, especially after cross-validation. For FS, PCR did not generate a significant model. ANN and PCR models indicated that fluorescence probe hydrophobicity (measured using cis-parinaric acid) and other properties, such as viscosity, surface tension and net charge were important in predicting FC and FS. SRA

1028

Buhri (AB) and Singh (RP). **Measurement of food thermal conductivity using differential scanning calorimetry.** *Journal of Food Science* 58(5); 1993; 1145-1147

To measure thermal conductivity of foods (rutabagas, radish, parsnip, turnip, potato, apple, carrot, nonfat dry milk, sugar, wheat flour), an attachment to a differential scanning calorimeter was constructed. A needle probe with a 40 gauge type-T thermocouple was used to measure the temp. of a cylindrical food sample. The differential scanning calorimeter heating pan temp. was maintained at 40°C for 5 min and then raised to 50°C. The average thermal conductivities of rutabagas, radish, parsnip, turnip, potato, green apple and carrot were 0.447, 0.499, 0.392, 0.480, 0.552, 0.405 and 0.564 W/m°C, respectively, for a temp. range between 40 and 50°C. It was concluded that the DSC method was reliable, precise, and a relatively rapid technique for determining thermal conductivity of foods. AA

1029

Stecchini (ML), Giavedoni (P), Sarais (I) and Lerici (CR). **Antimicrobial activity of Maillard reaction products against *Aeromonas hydrophila*.** *Italian Journal of Food Science* 5(2); 1993; 147-150

Growth response and metabolic activity of *Aeromonas hydrophila* in the presence of Maillard reaction products (MRP), prepared by heating a glucose-glycine solution at pH 8.8, were investigated. A gradual increase in antibacterial action of MRP was observed with increase in heating time of glucose-glycine solutions. For shorter heating times, a stimulating effect on growth was noticed, which was probably due to the unreacted glucose. Growth of A. hydrophila was significantly inhibited in the presence of MRP when loss of glucose involved in the Maillard reaction was > 40%. AA

1030

Nicoli (MC), Anese (M) and Lerici (CR). **Influence of pH on the kinetics of non-enzymatic browning in heat-treated glucose-glycine model systems.** *Italian Journal of Food Science* 5(2); 1993; 139-146

Influence of pH on rate of browning of a glucose-glycine model system was studied. Glucose and glycine loss, changes in absorbance and headspace CO_2 production were used as indicators of the development of the Maillard reaction. Rate of browning of the sugar-amino acid systems increased with increasing pH; in particular, a remarkable increase in the rate constant of glucose and glycine loss was observed between pH 8 and 10. AA

1031

Anese (M), Pittia (P) and Nicoli (MC). **Oxygen consuming properties of heated glucose/glycine aqueous solutions.** *Italian Journal of Food Science* 5(1); 1993; 75-79

The oxygen uptake of Maillard reaction products (MRP) formed from glucose/glycine solutions heated at 90°C for different times was studied using an oxygen electrode. Oxygen consumption increased as the heating time increased. The oxygen consuming properties of MRP were not found to be linearly related to the MRP concn. AA

1032

Thakur (BR), Singh (RK) and Arya (SS). **Chemistry of sorbates - a basic perspective.** *Food Reviews International* 10(1); 1994; 71-91

This report reviews and summarizes the degradation of sorbic acid (SA) in aqueous and model food systems, degradation in food systems, factors influencing degradation of SA (pH, antioxidants, transitional metal ions, other salts), sugar and glycerol, ascorbic acid, amino acids and proteins, a_W, packaging, temp., irradiation and microbial degradation) and role of non-enzymic browning reactions in these systems. 110 references. SRA

FOOD MICROBIOLOGY AND HYGIENE

Fermentation

1033

Delaquis (PJ), Fontaine (J), Dussault (F) and Champagne (CP). **Maple syrup as carbohydrate source in dry sausage fermentation.** *Journal of Food Science* 58(5); 1993; 981-982, 990

Potential use of Maple syrup (MS) as a carbohydrate source in the manufacture of dry sausage was investigated. MS was substituted for the glucose-sucrose (GS) component of a standard dry sausage formulation. Sausage batters containing either type of carbohydrate were inoculated with a mixed starter culture containing *Lactobacillus plantarum*, *Pediococcus acidilactici* and *Micrococcus varians*. Similar acidification patterns were observed in fermenting batters containing GS mixtures or MS, and processing yields were unaffected by carbohydrate type. However, instrumental texture measurements (shear and compression forces) revealed that sausage made with MS was significantly firmer than the standard product (P less than or equal to 0.05). It was concluded that MP could be used in the manufacture of novel fermented meat products. SRA

1034

Berg (DJC), Smits (A), Pot (B), Ledeboer (AM), Kersters (K), Verbakel (JMA), Verrips (CT). **Isolation, screening and identification of lactic acid bacteria from traditional food fermentation processes and culture collections.** *Food Biotechnology* 7(3); 1993; 189-205

This study describes a search for lactic acid bacteria (LAB) capable of exo-polysaccharide (EPS) production or exhibiting antimicrobial or proteolytic activities. Approx. 400 LAB were isolated from traditional fermented foods (sourdough, sausages, table olives, cheese and other dairy products). Together with almost 200 LAB strains from culture collections, these strains were screened for EPS production, bacteriocin production and proteolytic activity. 30 strains producing EPS and 8 *Lactococcus lactis* strains producing a nisin-like bacteriocin were selected. Proteolytic activities of all strains were determined, using a test based on casein degradation. As a result, a division was made into 4 groups with increasing proteolytic activities. Among the EPS-producing strains, 14 were isolated from various olive fermentations, all identified as *Lactobacillus paracasei*. EPS-producing strains isolated from Belgian salami were characterized as being closely related to *Lact. sake*. Another 10 EPS-producing strains were obtained from culture collections. AA

Microorganisms

Bacteria

Lactobacillus helveticus

1035

Norton (S), Lacroix (C) and Vuillemard (JC). **Effect of pH on the morphology of *Lactobacillus helveticus* in free-cell batch and immobilized-cell continuous fermentation.** *Food Biotechnology* 7(3); 1993; 235-251

The effect of pH control set point in the range 4.3-6.3 on morphology of *Lact. helveticus* [strain L89 Institut Rosell Inc., Montreal, Canada] was studied in free-cell batch and immobilized-cell continuous fermentations [ICCF] using a supplemented whey permeate medium. Mean chain length of *Lact. helveticus* was measured by microscopic observation in both free and entrapped phases. In free-cell batch fermentation, chain elongation of *Lact. helveticus* occurred progressively when pH set point was in the range 5.1-6.3. During ICCF, morphology was much less pH-dependent. This phenomenon could be due to the long response time of entrapped cells to daily random changes in pH set point. Bacterial counts, dry wt. and optical density measurements were compared in order to develop a methodology to ensure accurate biomass measurement in the different phases of the immobilized-cell bioreactor. BV

Fungi

1036

Rane (KD) and Hoover (DG). **Production of chitosan by fungi.** *Food Biotechnology* 7(1); 1993; 11-33

Production of chitosan (a novel biopolymer with industrial and food applications) from mycelia of *Absidia coerulea*, *Mucor rouxii*, *Gongronella butleri*, *Phycomyces blakesleeanus* and *A. blakesleeana* was studied. In batch culture, strains were screened to determine the fastest growing and greatest chitosan-yielding fungi. Optimum chitosan yields were observed for most cultures at 21 and 26°C in 1% yeast extract, 0.4% glucose and 0.3% peptone. *A. coerulea* ATCC 14076 and NRRL 1315 were the best producers of chitosan of the strains examined. Chitosan yields of *A. coerulea*, *M. rouxii*, *G. butleri*, *P. blakesleeanus* and *A. blakesleeana* were 47-50, 29-32, 21-25, 6 and 7 mg/100 ml of medium, respectively. Degree of acetylation of chitosan ranged from 6 to 15%; the lowest was from strains of *A. coerulea*. Viscosity av. mol. wt. of fungal chitosans were equivalent at approx. 4.5 x 10^5 Da. *A. coerulea* 14076 yielded the most chitosan, 51 mg/100 ml of medium at pH 5.5 in 48 h. Supplementation with 0.5 mg/100 of cobalt/100 ml medium showed an increase of approx. 20% in the chitosan yield from *A. coerulea* 14076. Batch fermentations were carried out in flask, airlift and stirred tank fermentors. Fermentation by continuous culture in the stirred tank reactor produced the highest amount of chitosan from *A. coerulea* 14076 resulting in an approximate 3-fold increase in chitosan production as compared to batch culture. BV

Aspergillus foetidus

1037

Hung (C-C). **Citric acid production by *Aspergillus foetidus* in batch and fed-batch cultures.** *Food Biotechnology* 7(3); 1993; 221-234

Sucrose and ammonium nitrate, respectively, were the preferred C and N sources for citric acid (CA) production by *Asp. foetidus* CCRC 30206. For a 7-day fermentation, max. CA production of 7.2-28.4 g/l appeared at an initial sucrose concn. of 12% under various initial levels of N and P sources. CA production commenced and ceased earlier in either the N-limited (NH_4NO_3, 0.5 g/l) or P-limited (KH_2PO_4, 0.2 g/l) medium. Richer media delayed the onset of CA production. 48.3 g/l CA was produced in a medium rich in N (NH_4NO_3, 2.0 g/l) and P (KH_2PO_4, 1.4 g/l) when the batch culture was extended to 16 days. Cultivation time of this rich medium was reduced to 12 days in a fed-batch culture under dual limitation of both N and P. AA

Aspergillus oryzae

1038

Ray (L) and Majumdar (SK). **Production of cellulases and β-glucosidase by *Aspergillus oryzae* and enzymatic saccharification of some cellulosic wastes.** *Research and Industry, India* 39(2); 1994; 105-108

Asp. oryzae grown in solid state fermentation produces carboxymethyl cellulase, filter paper degrading enzyme, and β-glucosidase with optimum activity of each enzyme component of pH 4.8 and 60°C. The organism is found to be a rich source of β-glucosidase (12.59 IU/ml). Glucose inhibits the β-glucosidase activity. Cysteine has stimulatory effect on the activity of cellulase components. Treatment of 2% rice straw (alkali-treated) with the mold culture filtrate at pH 4.8 and 60°C gives 59.85% saccharification in 72 h. AA

Rhizopus delemar

1039

Haas (MJ) and Bailey (DG). **Glycerol as a carbon source for lipase production by the fungus *Rhizopus delemar*.** *Food Biotechnology* 7(1); 1993; 49-73

The ability of the fungus *Rhizopus delemar* to sythesize lipase (glycerol ester hydrolase, E.C. 3.1.1.3) when grown on glycerol as the prime C source was investigated. Glucose, glycerol and olive oil all supported fungal growth and lipase production. Max. net and specific lipase activities obtained in glycerol were greater than those obtained in glucose and olive oil, and were reached earlier and maintained longer during growth. In glucose media, lipase activity did not appear until the glucose had been consumed. Differences in lipase activity between glycerol and glucose media were not due to pH-mediated lipase inactivation. In both glucose and glycerol media, the appeareance of lipolytic activity coincided with the appearance of lipase polypeptide. The data are consistent with the suggestion that lipase synthesis is subject to catabolite repression by glucose. These studies identify a simple, single-phase medium for lipase production and establish the utility of glycerol for amplifying enzyme levels. AA

BIOTECHNOLOGY

1040

Yogamoorthi (A). **Biotechnological developments and aquaculture prospects.** *Seafood Export Journal* 25(15); 1994; 9, 11, 13, 15, 17-18

Outlines the current trends in bio-tech application in aquatic animals; the need for international cooperation and the involvement of private and government sectors to ensure rapid advancement in marine biotechnological research and the progress in cell culture, cell fusion, cell organ transference and selection of mutant as future achievements in bioengineering. GS

1041

Cho (YH) and Knorr (D). **Development of a gel and foam matrix as immobilization system for cells for microbial denitrification of water.** *Food Biotechnology* 7(2); 1993; 115-126

An anaerobic denitrifying bacterium, *Paracoccus denitrificans* DSM 65, was used as a model organism for immobilization of microbial cells in a gel and foam matrix (GFM) system. Polyurethane foam cubes were soaked with a suspension of *P. denitrificans* in 3% alginic acid solution and then hardened in 0.1M $CaCl_2$ sol. The rate of nitrate reduction by *P. denitrificans* DSM 65 was determined by anaerobic incubation of the cells immobilized in GFM using water containing KNO_3 as substrate and sodium acetate as carbon source. Screening for optimum immobilization conditions was performed in shake flask cultures at 38°C under anaerobic conditions. A pore density of 20 pores per inch (PPI) and a cube size of 1 x 1 x 1 cm was identified as optimum for nitrate and nitrite reduction. Crushing of the gel matrix by uniaxial compression was an effective means for enhancement of denitrification. The GFM system may be applicable to denitrification of drinking water liquid foods as well as in waste water treatment. BV

1042

Hari (RK), Patel (TR) and Martin (AM). **An overview of pigment production in biological systems: Functions, biosynthesis, and applications in food industry.** *Food Reviews International* 10(1); 1994; 49-70

This review deals with pigments or biochromes, the chemical compounds absorbing specific wavelengths of visible light. A broad spectrum of pigments produced in the biological systems are reviewed in relation to their distribution and occurrence in the living world as well as the types, functions, and applications of the pigments in industry and aquaculture. In the last part, attention is focused on the mechanisms of their biosynthesis. 89 references. SRA

TISSUE CULTURE

Nil

FOOD ADDITIVES

Bulking agents

1043

Ranhotra (GS), Gelroth (JA) and Glaser (BK). **Usable energy value of selected bulking agents.** *Journal of Food Science* 58(5); 1993; 1176-1178

Usable energy value (calorific value) of 4 bulking agents (BA) (white wheat fibre (WF), polydextrose, isomalt and oligofructose) were evaluated using young rats as the test model. The net increase observed in carcass energy due to BA fed over a 3-wk period was evaluated. WF contained 0.9, polydextrose 0.8, isomalt 1.6 and oligofructose 1.5 calories/g. As a partial substitute for sugar, fat and/or flour, these BA could effectively reduce the energy content of foods. BV

Sweeteners

1044

Giese (JH). **Alternative sweeteners, and bulking agents.** *Food Technology* 47(1); 1993; 114-115, 118, 120-122, 124-126

Presents an overview of the characteristics, application and regulatory status of alternative sweeteners (saccharine, cyclamates, acesulfame-k, aspartame, peptide sweeteners, thaumatins, stevioside and rebaudiosides, glycyrrhizin, sucralose, dihydrochalones, L-sugars), the use of a bulking agent along with alternative sweeteners in certain food systems such as baked goods, confections and frozen desserts to provide the functions other than sweetness normally associated with sucrose. The article also discusses the features and uses of the alternative caloric or bulking compounds (cellulose, polydextrose, polyols). CSA

1045

Anon. **'Fructsweet' - a sugar alternative.** *Confectionery Production* 59(5); 1993; 419

Fructsweet, a combination of the artificial sweeteners aspartame and acesulfame K with selected fruit concentrates which has a natural and sugar-like taste and can deliver up to 80% reduction in calorie content in most applications is discussed. Fructsweet is supplied as a yellow/brown viscous liquid, with an av. shelf-life of 6 wk and a calorie count of 2.5 kcal/g and can be used as a sugar alternative in products like low-calorie drinks, yoghurts and dairy desserts. CSA

CEREALS

1046

Dahlin (KM) and Lorenz (KJ). **Carbohydrate digestibility of laboratory-extruded cereal grains.** *Cereal Chemistry* 70(3); 1993; 329-333

Whole-grain cereals (wheat, rye, corn, millet and low- and high-tannin sorghum) and quinoa were examined to determine the effects of lab. extrusion processing on in vitro carbohydrate digestibility. Extrusion variables included cereal var., extrusion temp., screw speed and feed moisture. Samples were incubated with human saliva, and products of digestion were quantified spectrophotometrically. Extrusion product temp. of 100/150°C had the greatest influence on improving in vitro carbohydrate digestibility for all cereals studied, as did 25% feed moisture and 100 rpm screw speed. Improving carbohydrate digestibility during extrusion processing appears to depend very strongly upon cereal type. Further studies are needed to assess optimal processing conditions for improved carbohydrate digestibility of particular cereal grains. AA

1047

Doernenburg (H) and Knorr (D). **Cellular permeabilization of cultured plant tissues by high electric field pulses or ultra high pressure for the recovery of secondary metabolites.** *Food Biotechnology* 7(1); 1993; 35-48

Chenopodium rubrum and *Morinda citrifolia* cells were subjected to high electric field pulses (0 to 1.6 kV cm^{-1}, 0 to 30 pulses) or high hydrostatic pressure (0.1 to 350 MPa, 10 min, RT) to examine their role in cell permeabilization. A max. amount of 85% of the total amaranthin content and 5.7% of total amount of anthraquinones of the cells could be released after treatment with electric field pulses. However, cell viability was lost at release values higher than 16 and 2%, respectively. Pressure treatment at 350 MPa resulted in pigment releases of 99 and 9.4%, respectively. Viability was lost at pressures of 110 and 75 MPa, respectively. Although the methods applied have limited potential for cell permeabilization while preserving cell viability, they are proposed as useful processes for metabolite recovery. AA

1048

Wrick (KL). **Functional foods: Cereal products at the food-drug interface.** *Cereal Foods World* 38(4); 1993; 205-206, 208, 210, 212, 214

The author introduces the concepts of food-drug interface, discusses some cereal ingredients and products that fall within the interface and the marketing of these foods, as well as the challenge such foods may pose to public health policy. CSA

Barleys

1049

Bason (ML), Ronalds (JA), Wrigley (CW) and Hubbard (LJ). **Testing for sprout damage in malting barley using the rapid visco-analyser.** *Cereal Chemistry* 70(3); 1993; 269-272

The ability of the Rapid Visco-Analyser (RVA) to detect sprout damage was assessed using 7 cv. of Australian malting barley. The RVA stirring number (SN, viscosity at 3 min) correlated well with falling number, α-amylase levels, and the subsequent life span of the grain. Sprout damage in malting barley could be reliably detected using the RVA SN method. The relationship between SN and retention of acceptable viability in storage for malting was used to devise a method for determining threshold SN values to indicate whether a sample is sound or damaged. Suggested cut-off values, below which a sample could be classified as damaged, ranged between 120 and 150 Rapid Visco units, depending on cv. AA

1050

Eerlingen (RC), Deceuninck (M) and Delcour (JA). **Enzyme-resistant starch. II. Influence of amylose chain length on resistant starch formation.** *Cereal Chemistry* 70(3); 1993; 345-350

Potato starch amylose was hydrolysed to varying degrees by incubation with barley β-amylase for different periods. Detn. of reducing sugars and gel-permeation chromatography showed that amylose fractions with different number av. chain lengths (degree of polymerization (DP_n) 40-610) were obtained. Enzyme resistant starch RS was formed from the fractions in aqueous sol. (0.83%, w/v) at 4°C. Under experimental conditions, the yield of RS increased with DP_n to plateau values of 23-28% within a region of DP_n of 100-610. X-ray diffraction showed a B-pattern for all RS samples obtained. The DP_n of RS varied only between 19 and 26 and, thus, it is independent of the chain length of the amylose from which it was formed (DP_n 40-610). Results suggest that RS may be formed by aggregation of amylose helices in a crystalline B-type structure over a particular region of the chain (about 24 glucose units). AA

1051

Eerlingen (RC), Crombez (M) and Delcour (JA). **Enzyme-resistant starch. I. Quantitative and qualitative influence of incubation time and temperature of autoclaved starch on resistant starch formation.** *Cereal Chemistry* 70(3); 1993; 339-344

Wheat starch was autoclaved (121°C) for 1 h in excess water. Subsequent formation of enzyme-resistant starch (RS) was studied as a function of time (at different incubation temp. of 0, 68 and 100°C). Rate of formation and max. yields of RS (4, 6 and 10%, respectively) varied to a great extent. The relationship between incubation time, temp. and yields of RS was interpreted in terms of crystallization in an amorphous matrix, the starch gel being a partially crystalline polymer system. Upon incubation at 0°C, nucleation rate was high and propagation rate was low; the opposite was the case upon incubation at 100°C. At 68°C, an intermediate pattern was observed. Incubation of the autoclaved starch samples at 2 subsequent temp. (0 and 68°C or 0 and 100°C, 2-step procedure) did not increase the RS yield significantly. X-ray diffraction showed qualitative differences among crystallites formed at different temp. RS formed at 100°C (A pattern) was different from that formed by incubation at 0 or 68°C (B pattern). X-ray diffraction of RS formed in a process with 2 storage steps at different temp. (0 and 68°C or 0 and 100°C), aiming at increasing yields by first favouring nucleation and then propagation, yielded B-type diffractograms. AA

Quinoa

1052

Ranhotra (GS), Gelroth (JA), Glaser (BK), Lorenz (KJ) and Johnson (DL). **Composition and protein nutritional quality of quinoa.** *Cereal Chemistry* 70(3); 1993; 303-305

Dehulled quinoa (*Chenopodium quinoa* Willd.) flour (Colorado D407) contained greater than 58% starch, 15.6% protein (N x 6.25), 2.7% sugars, 8.9% total dietary fibre and nearly 7% lipids and ash. The proportion of soluble fibre was only 13.5% of total dietary fibre. Quinoa was rich in several micronutrients, especially K, Fe, Ca and riboflavin. The lysine level in quinoa protein (6.3%) was comparable to that of soybean and was typical of dicotyledonous seed protein in being deficient in methionine. Based on animal studies (PER, protein digestibility and nitrogen balance), the quality of protein in quinoa matched that of casein. CSA

Rice

1053

Gupta (SC) and Sharma (KD). **Genetic studies on the mutagen induced variability for some quality characters in rice.** *Madras Agricultural Journal* 81(4); 1994; 205-206

Three rice var. (HPU 734, Himdhan and Madhu Malti) and F_2 seeds of two crosses (HPU 734/Himdhan and HPU 734/Madhu Malti), were subjected to mutagenic treatments viz. ethyl methane sulphonate (0.5 and 1.0%) and gamma ray (25 and 35 KR). Protein % increased in all 3 var. but decreased in both the crosses as compared to their controls. GS

1054

Eggum (BO), Juliano (BO), Perez (CM) and Khush (GS). **Starch, energy, and protein utilization by rats in milled rice of IR36-based amylose extender mutant.** *Cereal Chemistry* 70(3); 1993; 275-279

Utilization of starch, energy and protein from cooked milled rice of amylose extender (ae) mutant 2064 and its IR36 parent was examined in growing rats. Despite the higher lysine content of the ae mutant (3.83 vs. 3.32 g/16 g of N), NPU and protein quality of both rices were comparable because of the lower protein, energy and starch digestibility of the mutant. Starch, energy and protein digestibility of the mutant decreased progressively from raw to cooked to cooked-parboiled, with or without addition of the antibiotic Nebacitin (used to suppress hindgut fermentation) in the diet. Unlike the same ae mutants in corn, the rice ae mutant did not have a considerable increase in resistant starch with increased amylose content. AA

Ryes

1055

Vinkx (CJA), Reynaert (HR), Grobet (PJ) and Delcour (JA). **Physicochemical and functional properties of rye nonstarch polysaccharides. V. Variability in the structure of water-soluble arabinoxylans.** *Cereal Chemistry* 70(3); 1993; 311-317

Subsequent increases in the degree of ammonium sulphate saturation of a rye water extract allowed precipitation of at least 3 distinct arabinoxylan fractions that differed markedly in mol. wt. distribution and fine structure. A first (main) fraction, precipitated between 25 and 50% saturation, had an arabinose-to-xylose ratio (A/X) of 0.5 with virtually all branched xylose residues substituted at O-3 with arabinose (as shown by 500 MHz ^{1}H-NMR). This fraction contained ferulic acid (0.04-0.07%), had a lower mol. wt. than the other fractions, and gelled oxidatively with the hydrogen peroxide-peroxidase system. A second (small) fraction had an A/X of 1.4 and precipitated between 75 and 100% ammonium sulphate saturation. It did not gel. All branched xylose residues were substituted at both O-2 and O-3 with arabinose. Structures of 1, 2 and more consecutive, disubstituted xylose residues in the xylan chain could be recognized in the ^{1}H-NMR spectra. Fractions precipitating between 50 and 75% ammonium sulphate saturation were not mixtures of these 2 arabinoxylan fractions because the ^{1}H-NMR spectra showed differences in the ratio of isolated to paired disubstituted xylose residues. AA

1056

Vanhamel (S), Cleemput (G), Delcour (JA), Nys (M) and Darius (PL). **Physicochemical and functional properties of rye nonstarch polysaccharides. IV. The effect of high molecular weight water-soluble pentosans on wheat-bread quality in a straight-dough procedure.** *Cereal Chemistry* 70(3); 1993; 306-311

Addition of 2% high mol. wt. rye water-soluble pentosans to European bread wheat flour greatly changed its rheological and functional breadmaking properties. When rye fractions were added as dry powder, changes in mixograph curves were smaller than changes of fractions that were presoaked in water and then added. Under the latter conditions, mixograph peak height and area under the curve were greatly increased. Response surface methodology showed that loaf vol. of breads obtained from wheat flour is strongly dependent on mixing time and water addition. Addition of rye components as a fine powder to wheat flour increased water absorption level and range of mixing times for obtaining a bread of constant loaf vol. and crumb quality. At the same time, it was possible to incorporate more water and mix for a longer time without impairing the dough handling properties. Loaf vol. increased and crumb structure was comparable to that of the control. When high mol. wt. water solubles from rye were presoaked and added as a sol., the range of mixing times and the water absorption level were further increased. Mixing time and water absorption level strongly influenced loaf vol. The rye components used in this study influenced the quality of the wheat flour. AA

Wheat

1057

Bhirud (PR) and Sosulski (FW). **Thermal inactivation kinetics of wheat germ lipoxygenase.** *Journal of Food Science* 58(5); 1993; 1095-1098

Thermal inactivation curves for wheat germ lipoxygenases (LPO) in partially purified and crude extracts were determined in capillary tubes at 60-68°C. The biphasic curves fitted a 2-fraction 1st-order model suggesting the presence of 2 groups of isozymes. At 60°C, the inactivation rate constants were 9.112×10^{-5} s^{-1} and 9.174×10^{-6} s^{-1}, respectively, for thermolabile phase I and thermostable phase II in the partially purified extract, a difference of 1 order of magnitude. For the temp. change from 60 to 68°C, the rate constants increased by 3 orders of magnitude, implying a very high sensitivity (for LPO inactivation in partially purified extract $\Delta H = 646261$ J $mole^{-1}$, $\Delta S = 1619$ J $mole^{-1}$ K^{-1} for phase I, $\Delta H = 546099$ J $mole^{-1}$, $\Delta S = 1298$ J $mole^{-1}$ K^{-1} for phase II) to heat by both phases, although phase I was clearly the least stable. AA

1058

Bhirud (PR), Sosulski (FW) and Sosulski (K). **Optimizing assay and extraction of lipoxygenase in wheat germ.** *Journal of Food Science* 58(5); 1993; 1090-1094

Using 3-level 7-factor response surface methodology, wheat germ lipoxygenase (LPO) assay conditions were standardized. The most important parameters were concn. of the substrate (linoleic acid) and surfactant (Tween 20), pH and temp. The standardized LPO assay conditions for the 1 ml reaction vol. were: 450μM linoleic acid, 129μM Tween 20, 175μM ethanol, 1mM EDTA, pH 6.2 (phosphate buffer), ionic strength 100mM and 40°C. LPO extraction conditions were standardized by sequential variation of parameters. Optimum conditions were a single extraction of defatted wheat germ flour at 2-5°C with magnetic stirring of an extractant acetate buffer pH 4.5, ionic strength 100mM, at buffer-to-solid ratio 10:1. AA

1059

Monsalve (G-A) and Pomeranz (Y). **Effect of spring and winter growth habit on compositional, milling, and baking characteristics of winter wheats.** *Cereal Chemistry* 70(3); 1993; 354-359

Seven commercial winter wheat cv. were vernalized and grown under winter and spring habitat at 2 locations for 3 consecutive yr. Winter-planted wheats (WPW) were higher in test and kernel wt. and generally harder but were lower in protein and ash contents than their spring-planted (SPW) counterparts. Alkaline water retention capacity was consistently higher in SPW than in WPW. No consistent differences were recorded in soluble and total pentosans. Hardness and protein concn. were not significantly correlated. Differences in hardness, protein, ash, soluble and total pentosans, and alkaline water retention capacity of flours paralleled those in whole grains. Milling properties such as flour yield and milling score depended on test and kernel wt. Total flour yields (with higher reduction flour yields) and milling scores were consistently higher in the WPW than in their SPW counterparts. Protein dispersibility in urea was correlated with dough development time, water absorption and loaf vol. Cookie diam., generally, was higher in WPW than in SPW. AA

1060

Egidio (MGd), Nardi (S) and Vallega (V). **Grain, flour, and dough characteristics of selected strains of diploid wheat, *Triticum monococcum* L.** *Cereal Chemistry* 70(3); 1993; 298-303

Grain, flour and dough quality of 12 germ plasm accessions of domesticated diploid wheat, *Triticum monococcum* L. ("einkorn") was investigated and compared with that of modern cv. of *T. durum* and common wheat. Entries were assayed for kernel wt., test wt., yellow berry incidence, flour yield, whole meal ash and protein content, flour particle size, SDS sedimentation vol., and alveograph parameters, as well as for protein, gluten, ash and carotene content of flours. Flour yields of einkorn wheats were analogous to those of common wheat cv. and far greater than those of durum wheats. Gluten from *T. monococcum* was weak, scarcely extensible and rather sticky; it had a lower water-retention capacity than that of common and durum wheats. Reduced grain dimensions, high ash content, small flour particle size, and extremely high carotene content were distinctive features of the diploid wheats examined. The remarkably wide range of values observed for most of these attributes indicated that *T. monococcum* ted for producing the commonest wheat-based aliments could probably be identified in more extensive surveys or be obtained by breeding. Developing free-threshing commercial cv. of diploid wheat offers opportunities in foodstuff diversification, coeliac disease prevention, animal feed, production of protein-rich foods and in the exploitation of novel endosperm mutants. AA

1061

Souza (E), Tyler (JM), Kephart (KD) and Kruk (M). **Genetic improvement in milling and baking quality of hard red spring wheat cultivars.** *Cereal Chemistry* 70(3); 1993; 280-285

Forty five hard red spring wheats developed from 1911 to 1990 and commercially produced in the US Pacific Northwest region were evaluated for milling and baking quality using grain harvested from 3 Idaho locations in 1989 and 2 locations in 1990. Regression analysis, using yr of release as the independent variable, indicated significant improvement in mixing tolerance (0.046 degrees yr^{-1}), mixing time (0.019 min yr^{-1}) and corrected loaf vol. (0.079 ml yr^{-1}). Flour protein content declined significantly (-0.018 g kg^{-1} yr^{-1}) but there was no significant change in flour yield. Relative improvement of cv. baking quality over time was greater for flour from an irrigated environment than that from dry land environments. Rank summary of 8 important quality traits indicated that 9 of the 10 best quality wheat cv. were released since 1970. When grown under contemporary cultured practices, recently released cv. are generally superior to older cv. in overall baking quality and are comparable to older cv. in milling performance. CSA

1062

Andrews (JL), Blundell (MJ) and Skerritt (JH). **A simple antibody-based test for dough strength. III. Further simplification and collaborative evaluation for wheat quality screening.** *Cereal Chemistry* 70(3); 1993; 241-246

An antibody-based [enzyme-immunoassay] method for discrimination of wheat flours or whole meal on the basis of differences in dough strength as measured by extensigraph max. resistance for example, was simplified for use in large-scale screening to predict dough quality. The major modification was the addition of unlabelled antibody to the diluted grain extract being analysed, which simplified sample handling. It reduced the dilution of the grain extracts being tested and improved the differentiation between flours of different strengths. A method was also developed for simultaneous extraction and testing of sets of 96 unweighed whole meal samples. The method was tested in a collaborative trial in 8 lab. using 2 separate analyses of a set of 16 flours, including 3 blind duplicates. Each lab. reported highly significant correlations between colour developed in the assay and rheological measurements of dough strength, such as farinograph development time and extensigraph max. resistance. Good estimates of within- and between-lab. precision were also obtained, indicating that the method was suitable for quality assessment in wheat breeding. CSA

1063

Javanainen (P) and Linko (YY). **Utilization of sprout-damaged wheat as raw material for sour dough pre-ferments with mixed cultures of lactic and propionic acid bacteria.** *Food Biotechnology* 7(2); 1993; 99-113

Utilization of sprout-damaged wheat flour (WF) in pre-ferments for sourdough breadmaking increased lactic acid (LA) formation and titratable acidity several fold in comparison to the use of bakers' WF, and resulted in a lactic acid LA to acetic acid (AA) molar ratio acceptable for sourdough bread. Enzyme treatment of sprout-damaged wheat flour with malted grain flour appeared to be necessary for a properly balanced acid formation, although α-amylase activity of sprout-damaged WF was quite high. Accumulation of LA in the pre-ferment decreased in the presence of yeast; thus the molar ratio of LA to AA could be adjusted to values suitable for sourdough breadmaking even with homofermentative LA bacteria. When using mixed culture pre-ferments of *Lactobacillus brevis* and *Propionibacterium jensenii*, at least 0.1% propionic acid (based on flour wt.), sufficient to prevent mould growth in the final bread, was obtained. BV

1064

Cuperus (G), Noyes (RT), Fargo (WS), Kenkel (P), Criswell (JT), Anderson (K). **Reducing pesticide use in wheat post-harvest systems.** *Cereal Foods World* 38(4); 1993; 199-200, 202-203

This article defines the practical integrated pest management (IPM) systems for post-harvest management, examines the factors that control biological and economic risks in wheat storage and processing systems and describes the successful implementation of IPM systems. CSA

1065

Cunfer (BM). **Management of pests on wheat and other cereal crops with an IPM program.** *Food Reviews International* 10(2); 1994; 159-175

Review. 78 references. SRA

Wheat flour

1066

Cleemput (G), Roels (SP), Oort (M-van), Grobet (PJ) and Delcour (JA). **Heterogeneity in the structure of water-soluble arabinoxylans in European wheat flours of variable bread-making quality.** *Cereal Chemistry* 70(3); 1993; 324-329

The contents of water-soluble, enzyme-extractable, and total nonstarch polysaccharides (NSPs) were determined in flours from 6 European wheat cv. (Apollo, Slejpner, Sperber, Camp Remy, Minaret and Soissons) with different mixing time and baking absorption characteristics and, hence, widely varying bread making capacities. NSP contents varied between 0.42 and 0.69, 1.20 and 1.73 and 1.35 and 2.25%, respectively. Water-soluble NSPs were extracted and fractionated by ethanol precipitation into arabinoxylans and arabinogalactans. In the arabinoxylan fractions, β-glucan occurred as a minor contaminant. The L-arabinose to D-xylose ratios of such arabinoxylans varied between 0.51 and 0.61, whereas the ratios of di- to monosubstituted D-xylose residues (estimated by ^{1}H NMR) varied between 0.80 and 1.81. A major proportion of the xylan residues (63-66%) were not substituted by L-arabinose, whereas 13-21% and 16-24% of the D-xyloses were mono- or disubstituted, respectively. From ^{1}H NMR spectral data, it could be concluded that disubstituted D-xyloses were either isolated or occurred as pairs in the arabinoxylan chain. Shodex B-806 chromatography yielded, for all arabinoxylan fractions, 3 peaks with estimated mol. wt. between 8.5×10^5 and 5×10^3 Da, with only the relative proportions of the peaks, but not their mol. wt. varying with the variety. No apparent relationship was found between the mol. wt. profiles and the L-arabinose substitution pattern in arabinoxylans, Correlation coeff. between the analytical data obtained for the NSP content in the 6 European wheat flours and the baking absorption and mixing time of the corresponding flours increased when the structural variation in the arabinoxylans was taken into account, showing that increased knowledge of the arabinoxylan structure may lead to an enhanced understanding of the role of NSP in breadmaking. AA

1067

Ryu (GH), Neumann (PE) and Walker (CE). **Effects of some baking ingredients on physical and structural properties of wheat flour extrudates.** *Cereal Chemistry* 70(3); 1993; 291-297

Effects of 6 baking ingredients (sucrose, nonfat dry milk, whole egg powder, shortening powder, glyceryl monostearate [GMS], sodium bicarbonate) on expansion, bulk density, breaking strength and cell structure of wheat flour extrudates were studied. A Wenger TX52 twin-screw extruder was used to prepare extrudate samples. A one-half fractional 2^6 factorial experimental design was used to determine the effects of each baking ingredient on wheat flour processed under fixed extrusion conditions. Feed moisture content was 31%, barrel temp. before the die was 130°C, and screw speed was 400 rpm. Extrudate expansion was characterized by sectional, longitudinal and volumetric expansion indices (SEI, LEI and VEI, respectively). Cell structure was analysed by scanning electron microscope and by counting the number of cells per unit area. The SEI and LEI were significantly affected by both sucrose and GMS ($P < 0.01$). Interaction of shortening powder and GMS had significant effects on the LEI ($P < 0.01$), and a sucrose-egg interaction affected the SEI ($P < 0.05$). Bulk density was significantly affected by sucrose, shortening powder and GMS ($P < 0.05$). Sucrose and shortening powder had significant effects on breaking strength and cell structure. AA

1068

Seguchi (M). **Effect of wheat flour aging on starch-granule surface proteins.** *Cereal Chemistry* 70(3); 1993; 362-364

Prime starch was isolated from aged wheat flours by acetic acid extraction (pH 3.5). Starch-granule surface proteins were extracted from these starch samples with 1% SDS containing 1% 2-mercaptoethanol at room temp. (15-25°C) and quantified by the Lowry method. The amount of starch-granule surface proteins from aged flours was 3-4 times > the control samples. The SDS-PAGE pattern of extracted starch-granule surface proteins was different between control and aged samples. HPLC clearly showed that the higher molecular mass proteins (22-150 kDa) increased with ageing of the wheat flour. AA

Corn

1069

Dwivedi (R) and Godawat (SL). **Correlation between quality and ear/yield traits in maize (*Zea mays* L.) and their path coefficient analysis.** *Madras Agricultural Journal* 81(3); 1994; 125-127

Relationship between quality and ear traits in 58 high oil and protein strains of maize were studied. Grain yield per plant showed significant positive association with all yield and 2 quality traits (protein and oil). Path coeff. analysis revealed that 4 characters viz. total number of grains per ear, girth of ear, shelling % and 100-kernel wt. had max. positive direct and indirect contribution of grain yield. Oil and protein did not exhibit direct effect on yield but it had indirect contribution via total number of grains, girth of ear and shelling %. AA

1070

Mistry (AH), Xutian (Wu), Eckhoff (SR) and Litchfield (JB). **Wet-milling characteristics of high-temperature, high-humidity maize.** *Cereal Chemistry* 70(3); 1993; 360-361

Wet milling properties of high temp., high humidity corn were investigated and compared with normal high-temp., low-humidity corn. Two 1-kg samples of corn were processed at 21, 71 and 93°C and 18, 70, 80 and 1% RH. Final moisture contents were 13.9, 14.6, 14.6 and 14.5%, respectively, for each of these treatments. Corn dried at high temp. and high RH showed no significant differences in wet milling properties from corn dried at ambient temp. Corn dried at 93°C, 1% RH had lower starch yield than that dried at 93°C and 80% RH, indicating that combined effects of temp. and RH were more detrimental. Protein contents were not affected by drying conditions. Brabender viscosity properties of starches were similar for corn processed at 71°C, 70% RH and 93°C, 80% RH but were different for corn dried at ambient temp. Viscosity of starch from corn dried at 93°C was lower than that dried at ambient temp. High RH caused more shear thinning of starch than ambient drying. CSA

1071

Ramirez (W-B), Sweat (VE), Torres (PI) and Rooney (LW). **Development of two instrumental methods for corn masa texture evaluation.** *Cereal Chemistry* 70(3); 1993; 286-290

To evaluate corn masa texture, 2 instrumental methods were developed. The mechanical stickiness device (MSD) method used 2 rectangular bars (with movable upper bar) fastened at one end in a parallel arrangement with a 12-mm gap between them. A block of masa was formed between the bars and partially split with a special cutter, then one end of the movable bar was raised until the masa detached from it. The degree of adhesion of masa to the upper bar gave an adhesiveness index. The Instron compression-tension texture (ICTT) method compressed a masa disk between 2 flat plates to a thickness of 2 mm, then put the same sample under tension. Textural characteristics evaluated were adhesiveness, hardness and the compression-tension factor (CTF). Both methods tested masa made from nixtamal cooked for 55 min and conditioned at 3 moisture levels (56.8, 58.8 and 60.4%). Results were reproducible as evaluated by the coeff. of variation (range: 3.7-35.2%). Optimum masa had an MSD adhesiveness of 10-35%, ICTT adhesiveness between 8.7×10^4 and 1×10^5 Pa, and a CTF of 2.4-2.7. Masa moisture content increased adhesiveness and decreased hardness and CTF. MSD adhesiveness had a high correlation with ICTT hardness (r = -0.90). AA

1072

Eckhoff (SR), Jayasena (WV) and Spillman (CK). **Wet milling of maize grits.** *Cereal Chemistry* 70(3); 1993; 257-259

Maize grits obtained from the standard dry milling of whole corn kernels were studied as the raw material for wet milling. 1 size of corn grits (those that pass through a no. 5 and over a no. 10 screen), 2 levels of SO_2 concn. (0.1 and 0.2%), and 4 levels of steeping time (4, 6, 8 and 10 h) were used. Steep time could be reduced to 6 h, and SO_2 concn. could be reduced to 0.1% in wet milling of corn grits without any significant reduction in starch yield or increase in protein content of starch. Starch recovery of up to 88.9% [dry basis] (db) was achieved from the grits, compared to a 87.4% (db) recovery from the control samples (48 h, 0.2% SO_2, whole kernels). Protein content of starch was as low as 0.5% for the 10 h steep. Highest and lowest values recorded for apparent viscosity of starch among treatments were 462 and 377 Brabender units, respectively. Both of these values were significantly lower than that of the apparent viscosity of starch obtained from wet milling of whole kernels, which was 490 Brabender units. AA

1073

Sokhey (AS) and Chinnaswamy (R). **Chemical and molecular properties of irradiated starch extrudates.** *Cereal Chemistry* 70(3); 1993; 260-268

Corn starch samples containing 0, 25, 50 and 70% amylose were γ-irradiated at 0 (native), 5, 10, 20 and 30 kGy. All starch samples were extrusion cooked at 140°C barrel temp., 140 rpm screw speed, and 18% moisture content (dry wt. basis) using a Brabender single-screw extruder. Starches irradiated at a 20-kGy dosage were extrusion cooked with and without hydrogen peroxide, potassium persulphate, or ceric ammonium nitrate. Quantity of free radicals produced on the starch increased with increasing irradiation dosages (0-30 kGy). Stability of free radicals was greater for high-amylose starches than for those with low amylose. Extrusion-cooked starches had traces of free radical activity. Acidity of irradiated starches increased with increasing irradiation dosages. Gel permeation chromatographic separation of treated starches gave 3 fractions. Fraction I was mostly amylopectin; fraction II amylose; and fraction III contained degraded products of amylopectin and amylose. Fraction I quantities of irradiated starches decreased with increasing irradiation dosages, whereas fraction II and III quantities correspondingly increased. Native starches with 0% amylose exhibited more than a 4-fold decrease in fraction I content, whereas 70% amylose native starches showed < 2-fold decrease due to increasing irradiation dose from 0 - 30 kGy. Extrusion cooking accelerated degradation of fraction I for 0% amylose starches more than for 70% amylose starches. Both 2.5 and 5% concn. of chemical additives caused excessive degradation of fraction I of starches irradiated at 20 kGy, consequently increasing reducing powers. Ceric ammonium nitrate caused the highest decrease in the iodine binding capacity of starches. Fraction I clearly suffered more degradation due to irradiation, extrusion, addition of chemical agents or a combination of these. CSA

1074

Ziegler (GR), Thompson (DB) and Casasnovas (J). **Dynamic measurement of starch granule swelling during gelatinization.** *Cereal Chemistry* 70(3); 1993; 247-251

Swelling of corn starch granules during gelatinization was monitored by a new method based on particle size analysis (PSA). Using a modified PSA chamber, for which temp. could be increased at a controlled rate, a series of particle size distributions was collected throughout the gelatinization process. Swelling behaviour of common corn starch, waxy maize (WM) starch, and cross-linked WM starch was shown to be consistent for a given starch, yet different among the 3 starches. Max. swelling power (max. swollen granule vol. per initial hydrated granule vol.) was 11.2, 16.4 and 10.3 for common corn, WM and cross-linked WM, respectively. 2 other dynamic methods of monitoring gelatinization, DSC and viscometry (Brabender Viscoamylograph), were employed for comparison to the dynamic swelling data. CSA

Kodo

1075

Parvathi (S) and Rankanayaki (K). **Screening of kodo millet varieties for recipes development.** *Madras Agricultural Journal* 81(3); 1994; 143-144

Kodo millet (*Paspalum scrobiculatum* L.) can be consumed in many different forms by incorporating pulses, egg, milk etc. Physical characteristics of 3 var. of kodo millet viz., APK.1, K.1 and Co.3, standardization of various recipes and their overall acceptability were studied. APK.1 was found to be superior in all aspects. AA

Sorghum

1076

Jadhav (AS). **Growth, yield and quality of sorghum under double cropping systems with reference to fertilizer management.** *Madras Agricultural Journal* 81(3); 1994; 127-131

PULSES

1077

Hoppner (K) and Lampi (B). **Pantothenic acid and biotin retention in cooked legumes.** *Journal of Food Science* 58(5); 1993; 1084-1085, 1089

Samples of legumes (peas, lentils, beans, soybeans) were analysed raw for pantothenic acid (PA) biotin. Pooled samples were prepared in 1 of 3 cooking times: 20, 90 or 150 min. For each cooking time legumes were presoaked with a short soak (SS) or long soak (LS) treatment. Average PA retention in those cooked 20 min was 76% without pre-soaked, 33% for SS and 44% for LS. Biotin retention was 95% without pre-soak, 86% for SS and 90% for LS. In the 90 min group, PA acid retention differed between SS and LS (40 vs. 58%), but not for biotin (98 vs. 92%). There was no difference ($P > 0.05$) in retention between SS and LS in the 150 min group for either nutrient. It was concluded that biotin losses were min. compared to PA acid and methods of preparation could affect vitamin retention in legumes. BV

Carob

1078

Roukas (T). **Ethanol production from carob pods by *Saccharomyces cerevisiae*.** *Food Biotechnology* 7(2); 1993; 159-176

The production of ethanol from carob (*Ceratonia siliqua*) pods extract by *Sacch. cerevisiae* in static and shake flask fermentation was investigated. Shake flask fermentation proved to be a better system for the production of ethanol than static fermentation. Addition of nutrients into the carob pods extract did not improve ethanol production. Max. concn. of ethanol (75 g/l) was obtained with 0.3% inoculum, pH of 4.5, 30°C and initial sugar concn. 200 g/l. Under the same fermentation conditions, both sterilized and non-sterilized carob pods extract gave the same final ethanol concn. AA

OILSEEDS AND NUTS

Sesame

1079

Muthuswamy (P) and Sree Ramaulu (US). **Yield and mineral nutrition of gingelly (Sesamum indicum) genotypes in different soil series.** *Madras Agricultural Journal* 81(3); 1994; 136-138

Soybeans

Soy products

Soy proteins

1080

Brandenburg (AH), Weller (CL) and Testin (RF). **Edible films and coatings from soy protein.** *Journal of Food Science* 58(5); 1993; 1086-1089

A method was developed to prepare a protein-based edible films from commercial isolated soy protein (ISP). ISP was treated with alkali (ATISP) to alter film properties. Water vapour permeability (WVP), oxygen permeability (O_2P), tensile strength (TES), % elongation (%E) and appearance of ISP and ATISP were compared. Alkali treatment had no effect on WVP, O_2P and TES, gave higher %E and improved film appearance. Films properties were also compared at pH 6, 8, 10 and 12. In general, pH 6 gave higher WVP and O_2P and lower TES and %E; while higher pH gave lower WVP and O_2P and higher TES and %E. ATISP films could not be produced at pH 6. Film appearance generally improved with increased pH. BV

TUBERS AND VEGETABLES

Carrots

1081

Howard (LR) and Griffin (LE). **Lignin formation and surface discoloration of minimally processed carrot sticks.** *Journal of Food Science* 58(5); 1993; 1065-1067, 1072

Changes in colour, lignin, soluble phenolics, phenylalanine ammonia-lyase and peroxidase activity in carrot sticks packaged with and without ethylene absorbents during storage at 2°C was studied. Lignin formation occurred and corresponded with development of white discoloration in storage. Phenylalanine ammonia-lyase and peroxidase activity were stimulated by slicing and both enzyme activities remained elevated during storage. Soluble phenolics increased during storage, while DM content decreased within 24 h after processing and then remained constant during storage. Ethylene absorbents prevented accumulation of ethylene, but did not affect surface discoloration or lignification. BV

1082

Sims (CA), Balaban (MO) and Matthews (RF). **Optimization of carrot juice color and cloud stability.** *Journal of Food Science* 58(5); 1993; 1129-1131

Investigations were conducted on the effects of heating, acidification and enzyme treatment on carrot juice colour and cloud stability. Heating whole carrots to 93°C prior to milling and pressing improved juice colour, but reduced juice yield compared to heating milled carrots to 93°C. Juice colour was improved by acidification of milled carrots to pH 4 or 5 with citric acid prior to pressing. Juice from carrots heated before milling clarified quickly if not acidified before pressing. Acidification after juice extraction did not stabilize cloud. A commercial pectinase/hemicellulase preparation improved juice colour, but not juice yield. Only 20% of potential beta-carotene was extracted from carrots during pressing and β-carotene was extracted to a greater extent than α-carotene. AA

Cassava

1083

Padmanabhan (S), Ramakrishna (M), Lonsane (BK) and Krishnaiah (MM). **Enzymic treatment of cassava flour slurry for enhanced recovery of starch.** *Food Biotechnology* 7(1); 1993; 1-10

Use of enzyme treatment for enhancing the recovery of starch from cassava flour slurry was assessed. The recovery of starch from a 33.34% slurry of cassava flour was 61 and 68%, at 24 h, under static and agitated conditions using a conventional technique in the absence of enzyme. The extent of starch release was dependent on the type and concn. of enzymes as well as the conditions of the enzymic reaction. The starch present in the cassava flour was recovered completely when 0.1% pectinase I and 0.1% cellulase were used for 24 h at 30 plus/minus 1°C under agitated conditions; 98% of starch was recovered after 36 h in static conditions. The use of 0.2% enzyme reduced the time needed for complete recovery of starch to 12 h in agitated conditions. Results suggest that inclusion of the enzymic reaction in the conventional process is beneficial. BV

Potatoes

1084

Melton (SL), Trigiano (MK), Penfield (MP) and Yang (R). **Potato chips fried in canola and/or cottonseed oil maintain high quality.** *Journal of Food Science* 58(5); 1993; 1079-1083

Flavour and overall acceptability of potato chips fried in partially hydrogenated oils (canola oil (CA), cottonseed oil (CS) and Ca:CS) were investigated. Potato chips were fried in partially hydrogenated CA, CS and CA:CS blends (85:15 and 70:30) and stored (light or dark) for 4 wk. Peroxide value was not affected by oil type or storage conditions but increased with storage time. Flavour volatiles (26) were identified and quantified. Oil type affected concn. of chip volatile aldehydes (aldehydes were lower for chips fried in 70:30 CA:CS blends than for those fried in 85:15 CA:CS or

100% CA) but not heterocyclic compounds. No differences among oil types were found in fresh chip flavour or likability scores by a sensory panel. BV

1085

Sapers (GM) and Miller (RL). **Control of enzymatic browning in pre-peeled potatoes by surface digestion.** *Journal of Food Science* 58(5); 1993; 1076-1078

Feasibility of lye digestion to remove surface tissues from peeled potatoes prior to treatment with browning inhibitors to extend shelf life was investigated. Russet and round-white potatoes were digested in 14-20% NaOH at 35-55°C for 1-13 min. After removal of digested tissue, tubers were treated with ascorbic acid-based browning inhibitor. Browning was measured by tristimulus colorimetry. Digestion extended shelf-life of high pressure steam- and abrasion-peeled potatoes to 13-15 days at 4°C, compared to 3-11 days for undigested controls. Digestion resulted in wt. losses of 12-26%, depending on treatment conditions. Lye digestion in conjunction with conventional browning inhibitors represents a viable alternative to sulphiting pre-peeled potatoes. AA

1086

Sievert (D) and Wuersch (P). **Thermal behavior of potato amylose and enzyme-resistant starch from maize.** *Cereal Chemistry* 70(3); 1993; 333-338

Thermal.properties of potato amylose (degree of polymerization 5500) and of enzyme-resistant starch (RS) (degree of polymerization 65) from autoclaved maize starch in a conc. aqueous system (22%, w/w) were studied by DSC. Heating of amylose and RS in the DSC instrument to 180°C (heating rate 5°C/min) gave melting transitions at 153.6 and 139.8°C, respectively, indicating disorder of fairly thermostable regions. Heating to high temp. was accompanied by partial thermal degradation of the linear amylose and RS chains. Reappearance of endotherms during repeated heating and appearance of exotherms during each cooling phase suggested (re)association of chains from polymer melts of both amylose and RS. Association of amylose and RS chains appeared to start between 80-75°C and 60-55°C, respectively. Whereas interactions between the long amylose chains were reduced at cooling rates of > 10°C/min, interchain contacts between the shorter RS chains seemed not to be affected by cooling rate. In the presence of the complexing agent L-α-lysophophatidylcholine (LPC), the process of association of linear chains was competitively affected by the formation of inclusion complexes of the linear chains with LPC. At an LPC concn. of 10% (w/w), complex formation dominated, and no association of amylose or RS chains was observed. AA

1087

Biekman (ESA), Kroese (H-HI) and van Dijk (C). **Study of the enzymatic maceration kinetics of potatoes in a rotating perforated drum reactor.** *Food Biotechnology* 7(2); 1993; 127-141

A reactor system was developed to investigate enzymatic maceration kinetics of potatoes. The reactor consisted of a rotating perforated drum contained in a cubical box. During the maceration process the tissue liquefied, thereby increasing the dry wt. of the fluid. From the time-dependent increase of measured dry wt., the maceration rate constant k ($m.s^{-1}$) was determined. The effects of particle size, blanching time, enzyme concn., shear force and potato var. on the rate constant k were investigated. The rate constant increased with particle size and enzyme concn. The rate constant for unblanched potatoes was lower than for potatoes blanched for 5.0, 7.5, 10.0 and 12.5 min, but higher than for potatoes blanched for 2.5 min. Potato var. differing in textural properties showed different behaviour in maceration experiments. The measured rate constant for the var. studied ranged from 3.0×10^{-7} to 4.2×10^{-7} $m.s^{-1}$. The high enzyme costs, 13% of the raw material costs calculated on on the basis of the experimental results, showed that these costs will be prohibitive for large scale application of this technique. AA

1088

Maga (JA). **Potato flavour.** *Food Reviews International* 10(1); 1994; 1-48

The desirable and nondesirable volatile and nonvolatile flavour compounds identified in raw and processed potato products are discussed relative to their occurrence, formation and control. Covers raw potato volatiles, volatiles off-flavours in raw stored potatoes, glycoalkaloids and potato flavour (PF) nonvolatiles and PF, boiled PF, baked PF, potato chip flavour, french fried PF, dehydrated potato product flavour, extruded potato product flavour, potato sprout volatiles and potato processing waste volatiles. 207 references. SRA

Vegetables

1089

Kulkarni (CY) and Reddy (TKR). **Facultative pathogens from vegetable salads prepared in mass cooking establishments and detection of household pests as their reservoirs.** *Indian Journal of Microbiology* 34(2); 1994; 143-146

1726 isolates of bacteria belonging to 11 genera and 15 sp., were obtained on salads from each of local 3 hostels, hospitals, hotels and community kitchens. Hotel salads appeared to be microbiologically safe, whereas hostels, hospitals and community kitchen salads harboured 9 different types of facultative pathogens. *Proteus morganii* isolated from hospitals and community kitchen salads was also isolated from 4 pest droppings and cooks' hands. Similarly *Klebsiella pneumoniae* and *Enterobacter cloacae* I isolated from salads of community kitchens and hostels respectively were isolated from cockroach droppings. These results indicate the possibility of household pests serving as sources of contamination of facultative pathogens into salads. AA

1090

Zehnder (G). **Integrated pest management in vegetables.** *Food Reviews International* 10(2); 1994; 119-134

Review. 43 references. SRA

Broccoli

1091

Barth (MM), Kerbel (EL), Broussard (S) and Schmidt (SJ). **Modified atmosphere packaging protects market quality in broccoli spears under ambient temperature storage.** *Journal of Food Science* 58(5); 1993; 1070-1072

Broccoli spears (BS) were packaged using a semipermeable polymeric film and stored for 96 h at 20°C. CO_2 and O_2 concn. within the packages equilibrated to approx. 9 and 3%, respectively. Relative to non-packaged BS, ascorbic acid, chlorophyll and moisture retention were greater and peroxidase activity was lower in modified atm. packaged BS. No differences were found in total aerobic microbial growth or Instron shear values between packaged and control BS. BV

Gleditsia

1092

Gohar Khan and Farooqi (MIH). **Viscosity behaviour of vegetable *Gleditsia* seed gum.** *Research and Industry, India* 39(2); 1994; 120-124

Recently vegetable gum is used in various combinations and concn. Physico-chemical characterisitcs of *Gleditsia* gum in combination with microbial xanthan and carrageenan were determined. SEM studies showed a remarkable difference in structure of gum which may help to check adulteration and various application of gum. AA

Tomatoes

1093

Subbiah (K) and Raniperumal. **Studies on the effect of N, K and $CaCl_2$ on fruit cracking, skin thickness and density of tomato.** *Madras Agricultural Journal* 81(3); 1994; 138-140

Effect of N (0, 40, 80, 120 and 160 kg/ha), K (0, 50, and 100 kg K_2O/ha and $CaCl_2$ sprays (0.0% and 0.5%) on fruit cracking, skin thickness and density of fruits of tomatoes (var Co.1 and Co.3) grown during kharif season in vertisol indicated that 0.5% $CaCl_2$ sprays significantly decreased the fruit cracking. The interaction due to the levels of N, K and $CaCl_2$ sprays had marked effect on skin thickness. The interactions of N x K and N x Var. had significant influence on density of fruits. AA

1094

Subbiah (K) and Rani Perumal. **Pectin and ascorbic acid contents in tomatoes as influenced by the graded doses of N, K and $CaCl_2$** sprays. *Madras Agricultural Journal* 81(4); 1994; 227-229

Pectin and ascorbic contents of fresh, ripe tomato fruits of cv. CO.1 and Co.3 collected between 2nd and 4th pickings were analysed. Application of N significantly influenced the pectin content of tomato fruits and the highest pectin content was observed at 160 kg N/ha. Pectin content varied with the cv. and Co.1 registered the highest pectin content. Combined application of 100 kg K_2O/ha and 0.5% $CaCl_2$ sprays increased the pectin content. Application of 120 kg N/ha registered the highest ascorbic acid content while N exceeding the level reduced it. Application of K had no effect on ascorbic acid. Application of $CaCl_2$ increased the ascorbic acid content. Combined application of 120 kg N/ha plus 50 kg K_2O/ha proved superior in improving the ascrobic acid content. GS

FRUITS

1095

Gamero (M), Fiszman (SM) and Duran (L). **Stress relaxation of fruit gels. Evaluation of models and effects of composition.** *Journal of Food Science* 58(5); 1993; 1125-1128, 1134

Stress relaxation behaviour of kappa-carrageenan (1%) gels (C) and kappa-carrageenan (0.5%) plus locust bean gum (0.5%) gels (G) was studied. Effects of addition of sugar (18.3, 36.6 and 55°Brix) and fruit pulp (15%) on relaxation response were analysed. Curves were fitted to Maxwell (M), Peleg (P) and simplified Maxwell (SM) equations. All 3 equations were valid to quantify relaxation behaviour of fruit gels and to evaluate the effects of changes in composition, with P and SM equations being simpler. Locust bean gum increased initial stress decay rate and decreased proportion of unrelaxed force. Sucrose produced the opposite effect. Fruit pulp effects were weak and dependent on gelling system. AA

1096

Anon. **Rich's versatile freeze flo fruit range.** *Confectionery Production* 59(1); 1993; 41

The 'freeze flo' fruits manufactured for caterers, bakers and food manufacturers are made from natural fruits. They remain soft but firm in texture, are ice free and come in a wide range of flavours. They can be used to enhance the appearance, taste and overall quality of many dessert foods. Consideration is given to their versatility, suitability for new innovative products and use in health related food products. CSA

1097

Brunner (JF). **Integrated pest management in tree fruit crops.** *Food Reviews International* 10(2); 1994; 135-157

Review. 128 references. SRA

Apples

1098

Monsalve Gonzalez (A), Barbosa Canovas (GV) and Cavalieri (RP). **Mass transfer and textural changes during processing of apples by combined methods.** *Journal of Food Science* 58(5); 1993; 1118-1124

Mass transfer (MT) and textural changes of 'Red Delicious' apple slices and cylinders during osmotic adjustment of a_w by the combined method approach (low pH, low a_w and antimicrobial agents) were studied at 30, 40 and 50°C. MT of water and sugar in treated apples followed typical log-normal behaviour with most changes occurring during early stages of the process. The changes followed Crank's equation for diffusion. A negative correlation between apple texture and sugar diffusion was observed. Softening occurred at early stages of osmotic treatment. The texture changes were most pronounced at the edges of the apple tissue where the sugar had penetrated. Softening and sugar uptake were more pronounced when apples were acidified (citric acid, ascorbic acid and 4-hexylresorcinol). Apples became firm within 2 h of processing when the external layer of apple cylinders penetrated by sugar was trimmed. Calcium chloride > 0.30% minimized tissue softening, but the typical crispy structure of the fresh apple was not restored. BV

1099

Kim (DM), Smith (NL) and Lee (CY). **Quality of minimally processed apple slices from selected cultivars.** *Journal of Food Science* 58(5); 1993; 1115-1117, 1175

Slices of 12 apple cv. were stored for 12 days at 2°C. Changes in respiration and quality factors (firmness, colour, soluble solids, titratable acidity and wt. loss) were compared. Initial respiration rates among cv. varied from 3.5 ml CO_2/kg/h in Delicious to 7.6 ml CO_2/kg/h in Monroe and decreased rapidly during the first 3 days. Idared, McIntosh, Delicious and Rome showed relatively low respiration throughout storage. Firmness of slices during storage decreased gradually for 7 days and more rapidly thereafter. Empire, Golden Delicious and Idared apples showed min. changes in firmness. Change in colour of slices was rapid during the first 3 days. Cortland, Empire, Golden Delicious, New York 674 and Delicious showed least browning. Titratable acidity, pH, soluble solids, and wt. changes during storage were small and varied by cv. NY 674, Cortland, Golden Delicious, Empire and Delicious showed more desirable attributes for min. processing. SRA

1100

Kim (DM), Smith (NL) and Lee (CY). **Apple cultivar variations in response to heat treatment and minimal processing.** *Journal of Food Science* 58(5); 1993; 1111-1114, 1124

Eleven apple cv. were subjected to heat treatments (HT) at various times and temp. Susceptibility to browning during and after HT was evaluated. Changes in firmness, respiration rate, soluble solids and acidity of slices prepared with heat treated apples were measured. Incidence of browning was dependent upon cv. and heating temp.; Liberty, Monroe, RI Greening and Rome were very susceptible, while McIntosh, NY 674 and Empire were less susceptible. Golden Delicious and Delicious showed relatively strong tolerance to heat. Apples that received HT at 45°C produced slices with less browning and firmer texture compared to non-treated apples. The positive effect of HT might help produce high quality min. processed fruits. AA

Grapefruits

1101

Baker (RA). **Firmness of canned grapefruit sections improved with calcium lactate.** *Journal of Food Science* 58(5); 1993; 1107-1110

Hand cut commercially produced grapefruit sections (GFS), packed in either juice or syrup, were treated with 0.1-0.5% calcium lactate (CL) throughout the 1988-1989 season and monitored for changes in shear force resistance. Firmness of both juice and syrup control packs declined about 40% during the processing season. Ca addition did not reverse seasonal softening but incrementally decreased loss of firmness during processing. Improvements in texture were independent of seasonal changes, and remained relatively constant throughout the season. Optimal levels of CL were 0.3-0.4% for juice packed GFS and the highest level used was 0.5%, for syrup packed GFS. Max. increases in firming due to Ca in juice and syrup packed GFS were 38 and 50%, respectively. AA

Grapes

1102

Terrell (FR), Morris (JR), Johnson (MG), Gbur (EE) and Makus (DJ). **Yeast inhibition in grape juice containing sulfur dioxide, sorbic acid, and dimethyldicarbonate.** *Journal of Food Science* 58(5); 1993; 1132-1134

Effectiveness of preservatives (SO_2), sorbic acid (SA) , dimethyldicarbonate (DMDC) and their combinations) for inhibition of yeast spoilage in grape juice was studied. Grape juice was inoculated with yeast at 2, 200 and 20 000 cfu/ml; SO_2, SA, dimethyldicarbonate DMDC and combinations of these were evaluated for suppression of fermentation at 21 and 31°C. No significant differences were noted in fermentation times for SO_2, SB or SO_2 + SB treatments. 0.8mM DMDC was most effective in suppressing fermentation for all inoculation levels and temp.; 0.8mM SO_2 + DMDC and SB + DMDC were effective at 31°C. As preservative and inoculum concn. increased, time to fermentation increased and decreased, respectively. Storage at 31°C decreased effectiveness of SO_2, SB and SO_2 + SB, but increased effectiveness of DMDC and SO_2 + DMDC, and SB + DMDM at 0.8mM level. BV

Kinnow mandarin orange

1103

Panda (PC) and Ahlawat (SS). **Keeping quality of pasteurized kinnow egg liquid.** *Poultry Guide* 31(6); 1994; 27-29

Kinnow juice was mixed with fresh eggs and 0.1% potassium sorbate, pasteurized at 57°C for 15 min and stored at 4 plus or minus 1°C. Product was acceptable upto 4 days, though the bacterial spoilage was noticed only after 6 days. Pasteurization and adjustment of egg liquid pH to 4.5 was improved the shelf-life and acceptability of the Kinnow egg liquid. GS

CONFECTIONERY, STARCH AND SUGAR

1104

Siswoputranto (S). **Indonesia: a dynamic source of cocoa.** *Manufacturing Confectioner* 73(2); 1993; 61-64

Growth of cocoa production in Indonesia since the 17th century is briefly outlined with particular mention of Java and Sumatra. Exports of cocoa products from Indonesia in 1991 include (kg): cocoa beans 127 064 264; cocoa butter, fat and oil 10 509 329; cocoa paste 319 000; and chocolate blocks, slabs and bars (un-filled) 4 185 000. The 3 main importing countries for Indonesian cocoa products in 1991 were the USA, Germany and Singapore. CSA

Confectionery

1105

Gonze (M) and Schueren (F). **Sorbitol powder - a powerful performer in sugar-free tabletting.** *Confectionery Production* 59(5); 1993; 410-411, 420

The role of sorbitol powder in sugar-free tabletting and the ways in which sorbitol's performance can be modified are considered. They include: sorbitol morphology; flow; friability; flavour influence; flavour powder additions; and flavour liquid additions. CSA

1106

Anon. **Sollich systems for confectionery decoration.** *Confectionery Production* 59(3); 1993; 210-211, 214

Various sollich automatic confectionery decorating systems for chocolate products such as roll, disc and spiral decorators; eccentric decorator; fork mark decorator; decormatic SDC; decograph (high performance computerized, self-programable decorating system); decorating by sprinkling; cocoa powder sprinkling; and spiked truffles are described in this article. CSA

1107

Richmond (W). **Choice confections - hand rolled creams: manufacturing methods and formulas.** *Manufacturing Confectioner* 73(6); 1993; 81-92

Methods of manufacture of different hand-rolled sugar confectionery creams are outlined in this article. A typical basic product contains sugar, invert sugar, cream of tartar, frappe and water; the mixture is cooked to 244-246°C, poured onto a wet slab, cooled to about 100°C and creamed until cloudy, after which flavour, invertase and acid solution are added. The cream is then hand-rolled (or extruded through a hand-roll machine) until firm enough to dip in a suitable coating. A var. of flavours can be used. CSA

1108

Moore (C). **Direct steam cooking.** *Manufacturing Confectioner* 73(6); 1993; 73-76

The technical features of direct steam cooking which include: cooking equipment (continuous pressure cooking systems - steam injection cookers, swept surface heat exchangers, static coil cookers); direct steam injection cookers; and cooking operation (the slurry, steam supply, cooking system, steam separation) are discussed in this article. A flow diagram for a jet cooking system is also included. CSA

1109

Klacik (K). **Syrup cooking technology.** *Manufacturing Confectioner* 73(6); 1993; 59-62, 64, 66, 68-72

Aspects reviewed in this article are the ingredients (sugar, corn syrup, sugar-free ingredients, water, quality of ingredients); basic syrup preparation (solubility of raw materials, dissolution, boiling point basics); and cooking systems (types of hard candy cookers, extraction devices, fondant cooking, microbiological considerations). Also discusses the basic procedures that must be followed to determine whether the syrup is to be used for panning, hard candy, fondant or marshmallow; ingredients that must be blended in the correct ratio and must be totally dissolved to prevent uncontrolled crystallization; concn. that is to be carried out to give a specific solids content or degree of supersaturation; and the correct cooking system that must be chosen to prevent premature crystallization. 8 references. CSA

1110

Anon. **U.S. confectionery consumption 1992.** *Manufacturing Confectioner* 73(9); 1993; 107-114

A summary of the USA Department of Commerce report on sugar confectionery consumption in 1992 is presented. Significant increases in consumption, mainly in the non-chocolate sector, and a 2.5-fold increase in exports of non-chocolate products is reported. The increase in exports of chocolate and chocolate products in 1992 balanced the decrease experienced in 1991. Tables showing domestic consumption, imports and exports (quantity and value) of chocolate and non-chocolate confectionery products, and comparisons made with previous years are also included. CSA

1111

Anon. **European food dealer market.** *Manufacturing Confectioner* 73(9); 1993; 81-82

1112

Keunecke (K). **German sweet goods market.** *Manufacturing Confectioner* 73(9); 1993; 101-106

Effects of the adverse economic climate and of specific economic conditions in Germany since reunification are discussed in relation to the German sugar confectionery, chocolate, biscuit and ice cream sectors in 1992. Overall production of sweet goods decreased by 0.4% (chocolate products decreased by 4.2% and biscuits by 3.0%). Detailed production statistics (vol. and value) for individual products in the various sectors, are presented in pie charts and histograms. CSA

1113

Poehlmann (H). **International chocolate, sugar confectionery and biscuit industry 1991.** *Manufacturing Confectioner* 73(9); 1993; 85-90

Trends in consumption of chocolate, sugar confectionery and biscuits for the yr 1991 are tabulated individually in the article for the 13 IOCCC contributing countries (mainly European, plus Australia and Japan). Consumption overall has increased since 1980 (the 1st year of reporting), and particularly in 1989-1991. CSA

1114

Mitsch (B). **Flavor trends in the worldwide confectionery industry.** *Manufacturing Confectioner* 73(8); 1993; 29-32

Application of new technologies (application of fractionation techniques to citrus flavours; encapsulation; and reaction flavours (flavours developed during processing, complete flavour systems incorporating mouthfeel and taste as well as aroma) to the development of food flavourings is considered in the article together with flavour trends (globalization; reduced fat/sugar products; functional candy; market fragmentation; confectionery for children (fads, 'shock candy' e.g. which produces foam around the mouth); trends in other food areas (beverages, fruit snacks); popular flavours (sour, watermelon), and trends in confectionery around the world (Mexican-style flavours, healthy image products, chewing gum, sugar-free products, value-added products e.g. semi-pharmaceutical products)) in the sugar confectionery market. CSA

1115

Anon. **Directory of ingredients, equipment and packaging.** *Manufacturing Confectioner* 73(7); 1993; 27, 29-31

1116

Anon. . **Spanish confectionery market.** *Manufacturing Confectioner* 73(5); 1993; 25-26

1117

Anon. **UK chocolate/confectionery market.** *Manufacturing Confectioner* 73(4); 1993; 43-45

1118

Payne (G). **The Australian market place - a time of change?.** *Manufacturing Confectioner* 73(2); 1993; 45-51

1119

Anon. **US confectionery imports, September 1992 and year-to-date.** *Manufacturing Confectioner* 73(1); 1993; 32, 34, 36-40

1120

Gottlieb (A). **Why NAFTA is important.** *Manufacturing Confectioner* 73(1); 1993; 48-53

Chocolates

1121

Jeffery (MS). **Key functional properties of sucrose in chocolate and sugar confectionery.** *Food Technology* 47(1); 1993; 141-144

Aspects dealt in this article are the different types of confectionery-fat-phase and syrup-phase confectionery, the functional properties in fat-phase confections (sweetness, stability, bulk, particle size distribution, mouthfeel and acceptability, product rheology, crystalline-amorphous structure transformation, caramel flavour development in milk chocolate), functional properties in syrup-phase confections (sweetness, solubility in water, supersaturation, crystallization from super saturated sol., formation of gel structures, reactions with milk protein to give caramel flavours, breakdown with heat, acid and invertase) and the nutritional value of both fat-and syrup-based confections. CSA

1122

Sweger (LB). **Rapid *Salmonella* methodology in the chocolate industry.** *Manufacturing Confectioner* 73(6); 1993; 77-80

A review of the incidence of food poisoning and the methods for detection of *Salmonella* in chocolate products, is presented under the headings: reasons for rapid analysis; history (of analytical methods); comparison of systems; and other methodology. Rapid methods currently in use for detection of Salmonella spp. include: ELISA methods (complete systems such as Salmonella-Tek and Assurance EIA Rapid Method, the latter using a polyclonal system designed to reduce false positives); methods based on DNA hybridization (e.g. Gene-Trak); the Bio-Control 1-2 Test, a screening method for motile salmonellae in foods; the Hydrophobic Grid Membrane Filter (ISO-Grid); and conductance technology (e.g. Malthus M1000 system). 10 references. CSA

1123

Gutshall (Z-A) and Dimick (PS). **Influence of various refining treatments on the crystallization behavior of hard and soft cocoa butters and formulated dark chocolate.** *Manufacturing Confectioner* 73(9); 1993; 117-123

Commercial prime-pressed cocoa butters from the Ivory Coast and Brazil, and 2 Bahian butters, were classified as hard or soft as a result of crystallization curves and analyses for triacylglycerol and fatty acid methyl esters. The hard and soft cocoa butters, together with formulated dark chocolate (approx. 42% cocoa liquor, 46% sucrose, 12% cocoa butter and 0.15% lecithin), were then subjected to 4 variations of the standard refining treatment: (i) degumming (D), caustic neutralization (CN), water washing (W), bleaching (B) and deodorization (DO); (ii) D, CN, W and B; (iii) CN, W and B; and (iv) CN, W and drying. Results showed that all refining treatments reduced the induction period of crystallization, extent of the reduction varying with both treatment and cocoa butter source. In the soft Bahian cocoa butter, refining reduced induction time from 4 h to 60 min (treatment (iii)) and also increased crystallization rate. Effects of treatments on hardness, bloom stability and flavour of dark chocolate varied with the type of cocoa butter used in the formulation; in most cases bloom stability was improved compared with that of samples made with unrefined cocoa butter. CSA

1124

van der Waerden (T). **Netherlands cocoa and chocolate industry 1992.** *Manufacturing Confectioner* 73(9); 1993; 93-98

Starch

1125

Ray (L) and Majumdar (SK). **Enzymatic hydrolysis of starch to glucose, and immobilization of amyloglucosidase in calcium alginate gel.** *Research and Industry, India* 39(2); 1994; 109-112

Aspergillus oryzae amylases (α-amylase and amyloglucosidase) were used for both liquefaction and saccharification of starch from different sources. Optimum conditions for liquefaction of starch (25 ml starch-enzyme mixture in 50 ml Erlenmeyer flask), were pH 5.1, temp. 40°C, incubation period 2 h with shaking at 90 r.p.m. and for saccharification, pH 4.8, temp. 50°C, incubation time 22 h. Max. conversion of potato, tapioca, shati and soluble starch to glucose were 82, 82, 70 and 96.9% respectively. Then amyloglucosidase from *Asp. oryzae* was partially purified and immobilized in calcium alginate gel matrix that retained 77% of the activity of free enzyme. Optimum pH of the enzyme was shifted from 4.8 to 5.1 by immobilization optimum temp. remaining the same. Km values for free and immobilized enzyme were 0.4 and 0.1% respectively. Immobilized enzyme can be stored at 4°C for 28 days without any significant loss of activities. AA

1126

Lai (HM), Schmidt (SJ), Chiou (RG), Slowinski (LA) and Day (GA). **Mobility of water in a starch-based fat replacer by ^{17}O NMR spectroscopy.** *Journal of Food Science* 58(5); 1993; 1103-1106

The water mobility (WM) of starch-based fat replacers (SFR) (stellar, modified corn starch produced by controlled hydrolysis) affected by concn., type and level of ingredients (sugars, corn syrup solid, NaCl, proteins, gums and emulsifiers), heat and freeze/thaw treatments was studied using ^{17}O NMR spectroscopy. WM in the SFR samples containing gums, proteins or emulsifiers was similar to that of samples without additional ingredients. WM was not affected by heat treatment, but was increased by freeze/thaw treatments. WM in the solute containing samples was lower than in samples without additional ingredients and changed only slightly after heat and freeze/thaw treatments. BV

1127

Myeong (H-M) and Giddings (JC). **Rapid separation and measurement of particle size distribution of starch granules by sedimentation/steric field-flow fractionation.** *Journal of Food Science* 58(5); 1993; 1166-1171

Sedimentation/steric field-flow fractionation (Sd/StFFF) is introduced as a new technique for the size analysis of starch granules. Sd/StFFF provides both high speed and high resolution, and narrow size fractions of starch granules can be collected from the eluting stream for further characterization by microscopy or other techniques. The sedimentation FFF instrument (similar structure to the Model S101 Colloid/Particle Fractionator) was calibrated and applications were made to 12 starch samples derived from wheat, durum wheat, corn, oat, tapioca and potato. The instrument response curve (the fractogram) and size distribution curves for several of these samples were recorded. The mode or bimodal diam. and the % of A- and B-granules were compiled. AA

Sugar

1128

Awad (A) and Chen (AC). **A new generation of sucrose products made by co-crystallization.** *Food Technology* 47(1); 1993; 146-148

This article describes the process of co-crystallization, the unique functional properties of co-crystallized sugar products (improved homogeneity, improved dispersibility, control of sweetness release, improved solubility, improved emulsification) and the 3 categories of co-crystallized sugar products (food ingredients, intermediate products and instant products). CSA

1129

Baker (CW). **Production of sucrose-based carbohydrates for the food industry.** *Food Technology* 47(1); 1993; 149-150

Production of sucrose thermal oligosaccharides with desirable nutritional and functional characteristics from mixtures of non-crystalline sucrose and citric acid by low-temp. thermolysis and high-temp. thermolysis is described in this article. CSA

BAKERY PRODUCTS

1130

Anon. **New developments in fat mimetic technology for bakery products.** *Confectionery Production* 59(5); 1993; 418-419

N-Lite range comprising of 4 functionally different fat mimetics, which have been specially developed for 3 product groups of European food industry viz., dairy products, bakery products and liquid systems are discussed. They represent an effective and economical method of responding to the demand for high quality low-fat, low-cholesterol and low-calorie products. The use of N-Lite B, a waxy maize-based maltodextrin, to replace over 50% of bakery fats in a range of bakery products, are also dealt. CSA

Bread

1131

Roels (SP), Cleemput (G), Vandewalle (X), Nys (M) and Delcour (JA). **Bread volume potential of variable-quality flours with constant protein level as determined by factors governing mixing time and baking absorption levels.** *Cereal Chemistry* 70(3); 1993; 318-323

Six European wheat flours with varying breadmaking potentials (Apollo, Slejpner, Sperber, Camp Remy, Minaret and Soissons; Glu-1 scores 4, 4, 7, 6, 9 and 10, respectively) and pentosan levels were brought to constant protein level with starch. Breads were baked in a straight-dough procedure with varying mixing times (MT) and baking absorption levels (BA). Response surface methodology showed that, among all realistic combinations of interdependent variables of MT and BA, there is no optimum combination resulting in a superior bread loaf. Bread vol. increased with longer MT and higher BA levels, handling properties of the resulting doughs being the limiting factor. When flours of different cv., adjusted to a constant protein level, were baked with the same MT and BA, they yielded breads of essentially equal vol. Baking performance thus determined by applying the MT and BA levels showed that the differences in breadmaking potential of such flours must be attributed to a great extent to factors governing the mixing and absorption level characteristics of the flour. Analysis of pentosan contents indicated that higher water-soluble pentosan levels resulted in lower BA levels and mixing tolerance (and thus lower bread vol.), and that an inverse relationship existed between the handling properties of a dough and the flour water-soluble pentosan content. The Glu-1 score was in good agreement with the vol. potentials and MT of the different flours. CSA

Pan bread

1132

Siffring (K) and Bruinsma (BL). **Effects of proof temperature on the quality of pan bread.** *Cereal Chemistry* 70(3); 1993; 351-353

A variety pan bread formula was used in examining the effects of proof temp. with relatively constant proof duration. Proof temp. varied from 24 to 52°C, and enough yeast was added to keep proof times constant. Internal temp. of dough were monitored before and during baking and effects on finished loaf vol. and internal grain and texture were examined. A sponge-and-dough baking process was used for a 1-lb finished wt. product. Loaf vol. was greater at lower proof temp. Differences of up to 700 cm^3 in loaf vol. were found between lowest (75°F) and highest (125° F) proof temp. Dough from lower proof temp. had greater oven spring and better appearance. Crumb grain and texture were improved at lower temp. Lower proof temp. required increased yeast levels, but gave stronger dough properties and higher quality product. CSA

Pasta

1133

Farber (JM), Warburton (DW), Laffey (P), Purvis (U) and Gour (L). **Modified-atmosphere packaged pasta: a microbiological quality assessment.** *Italian Journal of Food Science* 5(2); 1993; 157-166

A national survey was conducted to determine the overall microbiological quality of fresh and frozen modified atmosphere packaged (MAP) pasta. All samples were analysed for aerobic colony counts (ACC), coliforms, *Escherichia coli*, *Staphylococcus aureus* and *Salmonella*. There was wide variation in ACC values, but 23.8 and 40% of the plain and filled finished products, respectively, contained > 10^6 cfu/g. Similar values were also observed for the total psychrotroph counts. Detectable levels of *S. aureus* were found in 17.5 and 33.7% of the plain and filled products, respectively; figures for *E. coli* were 4.3 and 24.2%. *Salmonella* spp. were not detected. Although no standards or guidelines for MAP fresh pasta are available, the impact of proposed 3-class plans for ACC, psychrotrophs, *S. aureus*, coliforms and *E. coli* was assessed in terms of % lot failures. AA

Spaghetti

1134

Malcolmson (LJ) and Matsuo (RR). **Effects of cooking water composition on stickiness and cooking loss of spaghetti.** *Cereal Chemistry* 70(3); 1993; 272-275

Effects of cooking water composition on stickiness and cooking loss of spaghetti made from durum and common wheat were examined using 7 cooking waters varying in mineral content. Water hardness was calculated as 1.7-512 p.p.m. of $CaCO_3$. All cooking waters had a pH of approx. 7.7 except deionized water. Regardless of the cooking water used, spaghetti made from common wheat was stickier than that made from durum wheat, and both were stickier when cooked in tap, well, or formulated waters (F3 and F4). The 2 spaghetti types showed similar cooking losses, except when cooked in well water. Spaghetti made from durum wheat did not appear to be as affected by hardness of the well water as spaghetti made from common wheat. Results confirm the need to use a standardized cooking water when comparing results from 1 test session to another or from 1 lab. to another. CSA

Tortillas

1135

Friend (CP), Waniska (RD) and Rooney (LW). **Effects of hydrocolloids on processing and qualities of wheat tortillas.** *Cereal Chemistry* 70(3); 1993; 252-256

Effects of hydrocolloids were evaluated in hot-press wheat tortillas. Natural gums (arabic, guar and xanthan), modified cellulose gums (MCG) (carboxymethylcellulose [CMC], hydroxypropylmethylcellulose and methylcellulose), and commercial blends (mixtures of natural and MCG) were utilized. Farinograph values, mixing characteristics, dough machinability, tortilla characteristics (diam., wt., moisture content and appearance), rollability over time, and freeze-thaw stability were determined. Increased levels of gums resulted in doughs that were more sticky and less cohesive throughout mixing. Doughs prepared with commercial blends containing cellulose gum exhibited characteristics similar to those using CMC, such as lower initial dough viscosity and longer dough development times compared with those of the control. Hot-press wheat tortillas containing natural gums, MCG, or commercial blends were consistently round, puffed, slightly browned, and of good quality. Tortilla diam. (159 mm), wt. (41.4 g), and moisture content (30.8%) were similar for all tortillas. Water absorption of dough increased when more gums were added. Rollability of tortillas was retained longer with CMC and cellulose-based commercial blends. Rollability of all tortillas decreased during freezing and thawing, and tortillas containing CMC were significantly more rollable than control tortillas after 5 freeze-thaw cycles. Proper gluten development appeared to be essential for good dough machinability, tortilla qualities and tortilla shelf stability. AA

MILK AND DAIRY PRODUCTS

1136

Prathap Reddy (K). **Measuring performance of dairy co-operatives.** *Indian Dairyman* 45(10); 1993; 446-453

Performance of dairy co-operatives is based on how far they have benefitted their owner-producer farmers, their profitability, new products development and development of their employees. Models of organisational effectiveness are compared against the criteria of overall performance, productivity, employee satisfaction, profit or rate of return and withdrawal. Internal and external factors facilitating the performance of dairy cooperative unions are listed. GS

1137

Rizvi (SSH), Zer (R-YU), Bhaskar (A) and Rosenberry (L). **Phase equilibria and distribution coefficients of** δ-lactones in supercritical carbon dioxide. *Journal of Food Science* 58(5); 1993; 996-1000

1138

Siva (CV), Sannabhadti (SS) and Shah (RK). **Control of bacterial endospores in dairy industry.** *Indian Journal of Dairy Science* 46(12); 1993; 547-554

This article reviews the significance of spore forming bacteria in milk and milk products and various methods of their control. Aspects covered are food poisoning outbreaks, defects in milk and milk products, control, at the farm, hygienic milk production and handling at the farm, bactofugation, creaming of milk, heat treatment, treatment of air, hydrogen peroxide treatment, use of lysozyme, nitrate, nisin and selected lactic starter, micellaneous treatments, cold pre-ripening of cheese and dairy plant hygiene. 146 references. SRA

Milk

1139

Ray Chaudhuri (AK). **Milk marketing.** *Indian Dairyman* 45(11); 1993; 491-493

One of the important factors on which the business of dairying depends on is what price is being received by the milk producers and what price is paid by the consumers. Producer's price depends on milk composition and also type whether it is cow or buffalo. Retail price similarly depends on the composition, type of milk, type of packaging and system of distribution. Retail price should not be beyond the consumers' purchasing power. On the other hand, the producers' price should be such that the farmers get a remunerative price. AA

1140

Bradley (RL). **Cholesterol removal from milk fat.** *Indian Dairyman* 46(5); 1994; 255-257

Advantages and demerits of 3 techniques for cholesterol removal from milk fat viz., stream-stripping process similar to vegetable oil refining, super-critical extraction method using carbon dioxide to selectively dissolve cholesterol, and adsorption technology where β-cyclodextrins, saponins, activated charcoal and other too expensive to be commercially viable are reviewed. Stream stripping technology is much in vogue. GS

1141

Dongjin (DLU) and Nielsen (SS). **Heat inactivation of native plasminogen activators in bovine milk.** *Journal of Food Science* 58(5); 1993; 1010-1012, 1016

Inactivation of plasminogen activators (PA) appeared to follow 1st order kinetics in the temp. range tested (60, 70, 80, 120, 130 and 140°C). The Arrhenius plot of Ft (ratio of PA activity at end of heating time to original PA activity) vs. heating time was linear (correlation coeff. 0.990). The Arrhenius equation for heat inactivation was deduced, from which the rate of inactivation at any temp. in the range 60-140°C could be calculated. Decimal reduction time (D-value) was 109 min at 70°C and 32 s at 140°C. This indicated that native PA in bovine milk were not affected by pasteurization, and to a large extent were not inactivated by UHT dairy processing conditions. SRA

1142

Ustunol (Z), Hicks (CL), Payne (FA) and Milton (K). **Effect of pH, temperature and enzyme concentration on diffuse reflectance profiles of coagulating milk.** *Italian Journal of Food Science* 5(2); 1993; 107-114

A randomized block design replicated 3x was used to determine effects of pH (6.3, 6.5 and 6.7), temp. (29.4, 32.2 and 35°C) and enzyme concn. (single strength calf rennet 0.177, 0.206 and 0.247 ml/900 g) on diffuse reflectance profiles of coagulating milk. Diffuse reflectance profiles were monitored for 30 min using a fibre optic sensor operating at 950 nm. Diffuse reflectance was observed to increase sigmoidally as coagulation time increased. Time to max. slope of the diffuse reflectance profile max. value of the first derivative at this time, and floc and cut points were determined. Slope of the diffuse reflectance curve increased as enzyme concn. and temp. increased and pH decreased. Time to floc and cut point decreased as enzyme concn. and temp. increased and pH decreased. Monitoring diffuse reflectance of coagulating milk in cheese vats may be a realistic method to determine an objective cutting point. AA

1143

Moio (L), Dekimpe (J), Etievant (PX) and Addeo (F). **The neutral volatile compounds of water buffalo milk.** *Italian Journal of Food Science* 5(1); 1993; 43-56

Volatile compounds isolated from water buffalo (*Bubalus arnee*) milk using vacuum distillation and subsequent liquid-liquid extraction were analysed. Analysis of the neutral volatile components using high resolution GC (HRGC) and HRGC/MS led to the identification of 75 constituents and evaluation of 51. The neutral volatile extract is mainly characterized by esters (50%), particularly ethyl esters of butanoic and hexanoic acid, aldehydes (14%), nitrogen compounds (13%), ketones (9%), aliphatic alcohols (5%), aromatic hydrocarbons (2.5%) and sulphur compounds (4%). Aroma of the individual components was assessed using HRGC equipped with sniffing port. The possible origins of these compounds and their relationship to the characteristic flavour of this milk are discussed. BV

1144

Solaroli (G), Pagliarini (E) and Peri (C). **Composition and nutritional quality of mare's milk.** *Italian Journal of Food Science* 5(1); 1993; 3-10

Information available on the production and composition of mares' milk is reviewed. Aspects covered include: production; sensory and physical characteristics; chemical composition; lipidic fraction; nitrogen fraction; and minor components. It is concluded that mares' milk has interesting nutritional properties, and is especially suitable for the elderly, convalescent consumers and infants. 45 references. BV

1145

Khedkar (CD), Garge (RD), Mantri (J-M) and Khedkar (GD). **Effect of feeding acidophilus milk on serum cholesterol in human subject of 40-50 years.** *Indian Journal of Dairy Science* 46(12); 1993; 577-580

Acidophilus milk (AM) was fed to 20 randomly selected human subjects between 40-50 yrs at 200 g/day for a period of 30 days. Blood serum cholesterol level (SCL) were analyzed before feeding the AM, during feeding and after stoping feeding. It was observed that the AM can significantly reduce the SCL during feeding. Though the SCL gets increased after 15 days of stopping feeding, it was observed to be significantly lower than the initial SCL. This study indicates that the *Lactobacillus acidophilus*-LBKV3 grown in milk is either able to uptake the cholesterol from gastrointestinal tract or inhibit cholesterol synthesis and reduce the SCL in blood. SRA

Milk products

1146

Baxi (JJ). **Export of milk and milk products.** *Indian Dairyman* 46(5); 1994; 229-235

The growth and prospects of the Indian dairy industry in comparison with the world milk production; production and export marketing of major dairy products like skimmed milk powder, whole milk powder, butter and cheese; GATT provisions and its impact on international trade; strategies to improve the quality and productivity of the dairy products and to reduce the cost of production; and the attempts of organised efforts in dairy development in India through co-operatives are reviewed. GS

Butter

1147

Safari (M), Kermasha (S) and Pabai (F). **Interesterification of butter fat by lipase from *Mucor miehei* in organic solvent media.** *Food Biotechnology* 7(3); 1993; 265-273

Butter fat was interesterified in 3 organic solvents, hexane, hexane-chloroform (70:30, v/v) and hexane-ethyl acetate (70:30, v/v), at 0, 0.2, 0.4, 0.6, 0.8, 1.0 or 1.2% water content, using commercial immobilized lipase from *M. miehei*. Results suggest that addition of 30% chloroform or ethyl acetate to hexane resulted in a 25% increase in interesterification yield; addition of 0.8-1.0% water shifted the hydrolytic affinity of lipase towards low mol. wt. fatty acids. However, addition of a small amount of water (0.4%) to hexane, increased amount of free fatty acids from 0.30 to 7.98 mmol/g butter. BV

Cheese

Cheddar cheese

1148

Tewari (BD) and Singh (S). **Performance of bacterial milk clotting enzyme from *Bacillus subtilis* k-26 in Cheddar cheese making.** *Indian Journal of Dairy Science* 46(12); 1993; 573-576

Milk clotting enzyme from a bacterial source *B. subtulis* K-26 was compared for its performance in cheese making with 5 commercial milk clotting enzymes from fungal sources, viz., *Mucor miehei* and *M. pusillus* var. Lindt. Acid development was almost similar in all cases but the total manufacturing time was slightly more in case of cheese making with the bacterial rennet. Yields were also similar. During ripening, changes in maturity index and total volatile fatty acids were slightly more in bacterial rennet cheese. However, changes in pH was slower. No marked differences in organoleptic quality of cheese was noticed after 3 months of ripening of cheese. AA

Comte cheese

1149

Roudot (A-F), Bars Dle, Einhorn (J), Adda (J) and Gripon (JC). **Flavor constituents of aqueous fraction extracted from Comte cheese by liquid carbon dioxide.** *Journal of Food Science* 58(5); 1993; 1005-1009

Isolation, purification and identification of some low-mol. wt. compounds from a water-soluble extract of Comte cheese were achieved. Liquid CO_2 extraction, subsequent fractionation by gel permeation and reverse-phase HPLC and MS were employed. Major constituents were N-acyl amino acids (N-acetyl methionine, N-propionyl methionine, N-propionyl leucine, N-propionyl phenylalanine), diketopiperazines (cyclo(Pro-Pro), cyclo(Pro-Val), cyclo(Pro-Phe), cyclo(Pro-Leu), cyclo(Pro-Ala)) and non-peptide compounds (theobromine, 4-methyl-t-thiazoleethanol, uracil, (5-6)dihydro-uracil, thymine). These compounds were synthesized and tasted. Most were bitter. N-propionyl methione had a cheese flavour but was not detected when added to a simulated cheese at 180 mg/l. SRA

Mozzarella cheese

1150

Yin (L-H), Yun (JJ) and Anandha Rao (M). **Rheological properties of Mozzarella cheese filled with dairy, egg, soy proteins, and gelatin.** *Journal of Food Science* 58(5); 1993; 1001-1004

The rheological behaviour of Mozzarella cheese (MC) mixed with various proteins (whey protein (WP), caseinate, egg white (EW), soy protein isolate (SPI), gelatin) was determined by uniaxial compression at 10°C and the effect of temp. (10-60°C) was determined by dynamic measurement. MC with WP, caseinate, EW and SPI showed significant water retention during heating. SPI induced the strongest gel network structure with MC. All proteins altered the viscoelastic properties of MC. Addition of proteins decreased the influence of temp. on complex viscosity. SRA

1151

Moio (L), Dekimpe (J), Etievant (PX) and Addeo (F). **Volatile flavour compounds of water buffalo Mozzarella cheese.** *Italian Journal of Food Science* 5(1); 1993; 57-68

The neutral volatile compounds in water buffalo Mozzarella cheese were isolated by distillation under vacuum and collected in traps cooled with liquid nitrogen. The distillate was extracted with dichloromethane and the extract obtained was analysed using high resolution GC (HRGC) and HRGC/MS. 85 compounds were identified and 65 quantitatively determined. The olfactory properties of many of these compounds were determined by sniffing the GC effluent. Ketones made up about half of the volatile components in the extract, acetoin being the most represented. A new compound also belonging to the ketones and with an aroma of smoked cheese was also detected. Alcohols (20%), aldehydes (10%), esters (1%), lactones (2.3%), sulphurous compounds (0.1%), aromatic hydrocarbons (3.4%) and nitrogen compounds (11%) were the other compounds present in this cheese. Most of the aldehydes and ketones identified, together with 1-octen-3-ol, linalool, geraniol, indole, 4-methylphenol and furfural are the volatile compounds which seem to influence the smell of this cheese to the greatest extent. AA

Taleggio cheese

1152

Piergiovanni (L), Fava (P) and Moro (M). **Shelf-life extension of Taleggio cheese by modified atmosphere packaging.** *Italian Journal of Food Science* 5(2); 1993; 115-127

Taleggio cheese was packed using 4 gas atm. (100% N_2, 10% CO_2 and 90% N_2; 20% CO_2 and 80% N_2; and 30% CO_2 and 70% N_2) and results were compared to those using paper wrapping. Packaged samples were stored for 3 wk at 6 plus/minus 2°C. Sensory analysis was then carried out, together with microbial and chemical analyses and analysis of rind colour. Results showed that all cheeses were of satisfactory quality after the storage period. Best results were, however, obtained with 10% CO_2 and 90% N_2 atm. Modified atm. packaging is therefore a suitable alternative to traditional paper wrapping for packaging Taleggio cheese. A simple model for predicting CO_2 evolution in the pack was developed and tested. Results showed that it was suitable for indicating appropriate packaging materials and packs of suitable dimensions. BV

Ice cream

1153

Moorthy (PRS) and Balachandran (R). **Low fat ice cream - a newer concept in frozen desserts.** *Indian Dairyman* 45(10); 1993; 454-455

Advantages of low-fat ice cream like low cost; expansion of the industry with the surplus fat; and cholesterol reduction; methods to reduce fat content of ice cream from a normal level of 10 to 12% without sacrificing its texture, taste, flavour and legal standards are presented. Low fat ice cream is cheap and also useful as low cholesterol diet. GS

Milk powders

1154

Awasthi (RC). **Milk powder market.** *Indian Dairyman* 46(5); 1994; 249-250

Highly perishable nature of milk causes problems in purchase and sale. In order to face the competitive world export market, Indian milk industry should adopt proper planning, consumer survey, quality control, advertising and promotional activities. GS

1155

Munjial (M). **Bulk density of milk powders - factors influencing it.** *Indian Dairyman* 46(5); 1994; 259-263

Criteria for designing a dryer for milk powder such as final powder composition; consumer preferences; shipping requirements; type of dryer (viz. co-current, counter current or mixed flow design). Optimum operating conditions (viz., the max. inlet air temp. and min. outlet air temp.); residual moisture content; bulk density, particle size distribution, colour, storage life, and flowability are detailed. GS

Milk proteins

1156

McSweeney (PLH), Olson (NF), Fox (PF), Healy (A) and Hojrup (P). **Proteolytic specificity of plasmin on bovine α_{s1}-casein.** *Food Biotechnology* 7(2); 1993; 143-158

Proteolytic specificity of plasmin (fibrinolysin, EC 3.4.21.7, from bovine plasma) on bovine α_{s1}-casein was determined in solution in 50mM ammonium bicarbonate buffer, pH 8.4, at 37°C. Peptides, isolated by reverse-phase HPLC on a C18 column or by electroblotting from urea-polyacrylamide gel electrophoretograms, were identified from their amino acid sequence and mass. The principal plasmin cleavage sites were found at Arg$_{22}$-Phe$_{23}$, Arg$_{90}$-Tyr$_{91}$, Lys$_{102}$-Lys$_{103}$, Lys$_{103}$-Tyr$_{104}$, Lys$_{105}$-Val$_{106}$, Lys$_{124}$-Glu$_{125}$ and Arg$_{151}$-Gln$_{152}$. The initial cleavage sites and the order of production of small (pH 4.6-soluble) peptides suggest that α_{s1}-casein was cleaved initially towards the centre of the molecule. AA

Wheys

1157

Hung (TY) and Smith (DM). **Dynamic rheological properties and microstructure of partially insolubilized whey protein concentrate gels.** *Journal of Food Science* 58(5); 1993; 1047-1049, 1054

Viscoelasticity and microstructure of gels prepared with 4 whey protein concentrates (WPC) with solubilities from 27.5 to 98.1% in 0.1M NaCl, pH 7.0 were evaluated. Dynamic moduli were determined while 16% (w/w protein) WPC in 0.6M NaCl, pH 7.0, was heated isothermally at 90°C for 15 min. Storage moduli (G') increased and tangent δ decreased when 80.0 and 98.1% soluble WPC were heated, whereas G' and tangent δ of 27.5 and 41.0% soluble WPC did not change. 27.5% soluble WPC had the highest G' throughout the heating period. Rheological measurements suggested that globular aggregates observed in 80.0 and 98.1% soluble WPC were formed during heating, whereas aggregates in 27.5 and 41.0% WPC were present prior to heating. AA

1158

McClements (DJ), Monahan (FJ) and Kinsella (JE). **Disulfide bond formation affects stability of whey protein isolate emulsions.** *Journal of Food Science* 58(5); 1993; 1036-1039

The viscosity and degree of flocculation of 20 wt.% n-hexadecane oil-in-water emulsions stabilized by whey protein isolate (1 wt.% WPI in 0.05M phosphate buffer, pH 7.0) increased as the emulsions aged. These effects were reduced but not completely eliminated when N-ethylmaleimide (0.5-20mM), a sulphydryl blocking agent, was added to the emulsions immediately after homogenization. SDS-PAGE showed an increase in the extent of intermolecular disulphide bond formation between proteins absorbed at the droplet interface with time. Flocs were probably formed initially by non-covalent bonding or bridging flocculation and then stabilized by disulphide bonds between proteins absorbed to different droplets. AA

1159

Mucchetti (G), Taglietti (P), Gatti (M) and Neviani (E). **Whey ultrafiltration: evaluation of protein retention with different membranes.** *Italian Journal of Food Science* 5(2); 1993; 99-106

Protein retention ability of 7 ultrafiltration (UF) membranes having different chemical composition, configuration and mol. wt. cut off (MWCO) was tested using defatted clarified Grana cheese whey. Exponential flux decay behaviour was typical for the tests. The best average flux of permeate was obtained with a spiral wound regenerated cellulose membrane (MWCO = 30 kDa) and with a plate acrylonitrile membrane (MWCO = 20 kDa). Protein retention was good for both membranes up to a vol. concn. factor of about 4 ($R > 0.97$). At a vol. concn. factor > 4 the protein content of permeates increased. Ion-exchange chromatography showed the presence of alpha-lactalbumin in all the permeates, whereas beta-lactoglobulin was only detected in the permeates obtained by UF with polyvinylendifluoride membranes (MWCO = 40 kDa) and hollow fibre polysulphone membranes (MWCO = 50 kDa). Membranes having 100 kDa MWCO are not suitable for the production of whey protein concentrates, but they may be the first step of a fractionated separation of proteins with larger MWCO, such as lactoferrin from whey. AA

Yoghurts

1160

Laye (I), Karleskind (D) and Morr (CV). **Chemical, microbiological and sensory properties of plain nonfat yoghurt.** *Journal of Food Science* 58(5); 1993; 991-995, 1000

Chemical and microbiological properties of 4 plain nonfat yoghurts (3 commercial and 1 control) were determined after 2, 6 and 12 days refrigerated storage. Sensory properties were determined after 6 days storage. Viable culture bacteria concn. ranged from 140 to 8000 x 10^6g and ratios of *Lactobacillus* to *Streptococcus* ranged from 0.18 to 15.4. pH, titratable acidity, lactic, pyruvic, uric, acetic and propionic acids and lactose were determined by HPLC and 23 major volatile organic compounds were determined by dynamic headspace analysis. Lactic acid concn. ranged from 7.5 to 9.9 mg/g while pyruvic, uric, acetic and propionic acids ranged from 5.5-23.1, 32.5-68.1, 112-204 and 50-193 µg/g, respectively. pH ranged from 4.17-4.58 and titratable acidity from 0.92-1.40 for all 4 yoghurts, throughout 12 days refrigerated storage. Major flavour volatiles in all yoghurts included: acetaldehyde; heptane; acetone; diacetyl; and benzothiazole. Sensory panels indicated a preference for control No signifcant differences were noted in texture, flavour or overall acceptability of the 3 commercial yoghurts. AA

MEAT AND POULTRY

Meat

1161

Mermelstein (NH). **Controlling *E. coli* 0157:H7 in meat.** *Food Technology* 47(4); 1993; 90-91

Fatal food poisioning outbreak caused by the consumption of undercooked *E. coli* 0157:H7 contaminated hamburgers which led the USDA to propose improved inspection procedures is discussed in this article. CSA

1162

Skog (K). **Cooking procedures and food mutagens: A literature review.** *Food and Chemical Toxicology* 31(9); 1993; 655-675

This review covers cooking procedures, influence of cooking time and temp. on mutagenic activity, identity of mutagens (pyrido-imidazoles or indoles, quinolines, quinoxalines, pyridines and furopyridines) occurrence in cooked foods, formation of mutagens, chemical factors affecting the yield (amino acids and dipeptides, sugars, inhibitory effect of sugars and other carbohydrates, other inhibitors and fats) animal studies, risk evaluation and general discussion. 159 references. BV

Beef

1163

Boyle (EAE), Sofos (JN) and Schmidt (GR). **Depression of a_w by soluble and insoluble solids in alginate restructured beef heart meat.** *Journal of Food Science* 58(5); 1993; 959-962, 967

1164

Stillmunkes (AA), Prabhu (GA), Sebranek (JG) and Molins (RA). **Microbiological safety of cooked beef roasts treated with lactate, monolaurin or gluconate.** *Journal of Food Science* 58(5); 1993; 953-958

Beef roasts were pumped with sodium lactate (SL), glycerol monolaurin (GM) or sodium gluconate (SG) and inoculated with *Clostridium sporogenes* and *Listeria monocytogenes* either internally or on external (surface) locations. Microbiological evaluations were conducted during simulated wholesale (2°C), retail (7°C) and consumer storage (10°C) and after simulated mishandling (25°C). SL resulted in effective inhibition of pathogens at concn. less than or equal to 3.5%. GM was less effective than SL. SG did not provide significant control of *Cl. sporogenes* and *L. monocytogenes*. No chemical or quality effects of these compounds occurred on the beef roasts except a lower pH and increased purge caused by monolaurin. BV

1165

King (JW), Johnson (JH), Orton (WL), McKeith (FK), O'Connor (PL), Novakofski (J), Carr (TR). **Fat and cholesterol content of beef patties as affected by supercritical CO_2 extraction.** *Journal of Food Science* 58(5); 1993; 950-952, 958

1166

Duizer (LM), Gullett (EA) and Findlay (CJ). **Time-intensity methodology for beef tenderness perception.** *Journal of Food Science* 58(5); 1993; 943-947

The Time-Intensity (TI) technique for measuring tenderness of bovine psoas major, longissimus dorsi, semitendinosus and shank was assessed. Results were compared to conventional line scale measurement of tenderness. From the TI curve, the duration and area parameters (Increase and Decrease Area and Area Under the Curve) were most useful for sample separation. Using various TI curve parameters, panellists were classified according to their perception of tenderness, with 2 clusters identified. A comparison of line scale results of force to chew and time to chew to the TI results showed that comparable tenderness measurements were obtained by the 2 tests. AA

1167

Madhavi (DL) and Carpenter (CE). **Aging and processing affect colour, metmyoglobin reductase and oxygen consumption of beef muscles.** *Journal of Food Science* 58(5); 1993; 939-942, 947

1168

Venugopal (RJ), Ingham (SC), McCurdy (AR) and Jones (GA). **Anaerobic microbiology of fresh beef packaged under modified atmosphere or vacuum.** *Journal of Food Science* 58(5); 1993; 935-938

Beef was packaged under CO_2 containing < 500 p.p.m. O_2, vacuum or air and stored at 0, 2 or 4°C. Samples were analysed weekly for bacterial numbers using anaerobic plate count (pre-reduced medium and anaerobic chamber), aerobic plate count and anaerobic jar plate count (MAP samples only) methods. For both MAP and vacuum packaged samples, the anaerobic plate count was consistently greater than the aerobic plate count and for MAP samples the anaerobic plate count was consistently higher than the anaerobic jar plate count. Differences between plating methods were most frequent during the latter third of 0 and 2°C storage. Anaerobic isolates from MAP samples were most often lactic acid cocci and staphylococci. No clostridia were isolated from any of the treatments. Results suggest that when 37°C incubation temp. is used, anaerobic plate counts are more accurate than aerobic plate counts for estimating the microbial load of fresh MAP beef. BV

1169

Lan (YH), Novakofski (J), Carr (TR) and Mckeith (FK). **Assay and storage conditions affect yield of salt soluble protein from muscle.** *Journal of Food Science* 58(5); 1993; 963-967

Pork *Longissimus dorsi* and beef *Longissimus dorsi* and semimembranosus muscles were used to evaluate assay and storage effects on yields of salt soluble protein (SSP). Assay conditions included pH (5.5, 6.0 or 6.5), extraction vol. (6, 9, 12 or 15 x sample wt.), homogenization time (30, 60, 90 or 120 sec) and centrifugal force (2500, 4000 or 5500 x gn). Storage conditions included post mortem ageing (4°C) for 0, 7 or 14 days) and freezing (rapid freezing, slow freezing and freezing-thawing-freezing). Highest yield of SSP was obtained using pH 6.0, extraction fol. 15x sample wt., centrifugation at 4000 x gn and homogenization time 90-120 sec for both pork and beef. Freezing conditions did not affect measurement of SSP. Aging beef for 7 and 14 days post mortem reduced yield of SSP; however, such differences were not observed for pork. BV

Pork

1170

O'Connor (PL), Brewer (MS), McKeith (FK), Novakofski (JE) and Carr (TR). **Sodium lactate/sodium chloride effects on sensory characteristics and shelf-life of fresh ground pork.** *Journal of Food Science* 58(5); 1993; 978-980, 986

Fresh ground pork was formulated with sodium lactate (SL) (0, 1.5 or 3%) and NaCl (0, 0.5, 1, 1.5, 2, 2.5 or 3%) to evaluate effects on sensory characteristics. Aerobic plate count (APC) over retail storage (25 days) was evaluated on samples rated in the mid-range (plus/minus 0.5 S.D of mean) of salty flavour intensity (SI) by a trained sensory panel. SL increased ($P < 0.05$) SI and juiciness and enhanced ground pork flavour. Sodium added as SL was less perceptible as 'salty' than that added as NaCl. SL significantly reduced ($P < 0.05$) APC; based on spoilage level of 10-6 cfu/g, SL extended shelf life (3% SL) by about 12 days compared to controls. AA

1171

Rourke (TJ), Clarke (AD), Bailey (ME) and Hedrick (HB). **HPLC quantitation of alginate or pectin added to lean ground pork.** *Journal of Food Science* 58(5); 1993; 973-977

An HPLC method is reported for isolating and quantifying uronic acid(s) (UA) of alginate or pectin added at various concn. to lean (5-7% crude fat) ground pork. The method uses an Aminex HPX-87H$^+$ column, isocratic 0.009N H_2SO_4 eluent and UV detection. For regression equations derived from mean UA concn. to predict % of alginate or pectin, R^2 values were 0.99 for total UAs (alginate) and 0.97 for galacturonic acid (pectin). Reproducibility was 84% for alginate and 94% for pectin contents. Recoveries were: alginate 85% and pectin 80%. SRA

1172

Bozzano (AI), Guardo (G-di), Saccares (S), Bilei (S), Zottola (T), Brozzi (AM), Panfili (G), Fontanelli (G). **Occurrence of Salmonella in pork meat and processed pork products in the Latium region (Central Italy) from 1980 to 1989.** *Italian Journal of Food Science* 5(2); 1993; 167-172

Products

Meat

1173

Eilert (SJ) and Mandigo (RW). **Procedure for soluble collagen in thermally processed meat products.** *Journal of Food Science* 58(5); 1993; 948-949

Methods to determine the extent of collagen solubilization during thermal processing in frankfurters were evaluated. A modified procedure to separate soluble collagen from thermally processed meat samples without solubilizing more collagen was developed. Frozen, powdered frankfurter was mixed with Ringers solution in test tubes. Stirred samples were incubated in water baths at temp. of 36, 40, 44, 48, 52 and 56°C for 5, 10 and 15 min. Samples were centrifuged, filtered, autoclaved and hydroxyproline levels were assayed spectrophotometrically. Collagen values were expressed as mg collagen/g of sample, using hydroxyproline conversion values of 7.25 and 7.52 for insoluble and soluble collagen, respectively. Soluble collagen increased up to 48°C and 10 min, leveling off beyond that. In a 48-52°C water bath 10-15 min was sufficient to separate soluble collagen from thermally processed meat products without solubilizing more. BV

Ham

1174

Careri (M), Mangia (A), Barbieri (G), Bolzoni (L), Virgili (R), Parolari (G). **Sensory property relationships to chemical data of Italian-type dry-cured ham.** *Journal of Food Science* 58(5); 1993; 968-972

Poultry

Chickens

1175

Lee (S-T), Randall (VG) and Schade (JE). **Chlorine uptake by chicken frankfurters immersed in chlorinated water.** *Journal of Food Science* 58(5); 1993; 987-990

Chicken frankfurters, with and without the processing casing wrapped on the outside, were soaked in water containing 1.1-11.3mM hypochlorite (HC) for 1, 4 and 24 h. Casing retarded, but did not prevent chlorine uptake which increased with increasing HC concn. of immersion sol. and with increasing immersion time. For frankfurters with casing, uptake of chlorine by a 45 g frankfurter immersed for 1 h in 2.8 or 11.3mM HC sol. was 18 and 72 µmoles, respectively. Immersed for 24 h, uptake was 99 and 268 µmoles, respectively. Rate of chlorine uptake increased with concn. of chlorine in water but decreased rapidly with time. BV

Broilers

1176

Dhande (VU), Kukde (RJ) and Lende (RM). **Influence of feeding livol on dressed and edible meat percentage of broilers.** *Poultry Guide* 31(7); 1994; 57-59

Meat quality of broilers fed on diets supplemented with livol at 0.2% (T1) and 0.5% (T2) levels was compared with the control at the age of 8th wk. Average live body wt. were 1280.52 g., 1503.25 g and 1594.31 g, average dressing % 78.87, 79.82 and 87.81 and edible meat % 67.23, 68.52 and 74.95 in control, T1 and T2 groups respectively. Hence, there were no significant differences between its treatment. In T1 and T2 there was a 2-5% increased growth over the control group. The cost of feed required per kg edible meat in experimental broilers at 8th wk of age were Rs. 11.74, Rs. 10.51 and Rs. 11.34 in control, T1 and T2 groups respectively. AA

Turkeys

1177

Northcutt (JK), Lavelle (CL) and Foegeding (EA). **Gelation of turkey breast and thigh myofibrils: changes during isolation of myofibrils.** *Journal of Food Science* 58(5); 1993; 983-986

The relationship between functional properties of meat and myofibrils was examined for turkey breast and thigh by determining gel-forming ability of proteins at each step in a myofibril isolation procedure. Physical properties of thermally induced gels (70°C for 30 min) were determined by torsional fracture analysis. Max. shear stress (force) was obtained after removal of water-soluble components, whereas filtration was required to achieve max. shear strain (deformability). Shear stress increased 150% and shear strain 59%. Changes in fracture properties were similar between meat types, and therefore, not the cause of meat type-associated differences in comminuted turkey. AA

Products

Eggs

1178

Pandey (NK), Anand (SK) and Verma (SS). **Peelability and quality characteristics of hard cooked shell eggs stored at**

refrigeration temperature. *Indian Journal of Poultry Science* 29(1); 1994; 67-71

Peeling characteristics, microbial and sensory profile of hard cooked shell eggs stored at refrigeration temp. (5°C) were evaluated at 0, 3, 5, 7, 10, 14, 18 and 21 days. Stored eggs showed no improvement in peelability, peeled surface appearance, yield of peeled eggs and peeling time. No significant change was observed in either total aerobes or yeast and moulds of egg contents. However, staphylococcal counts recorded an increase while the coliforms appeared only after 14 days of storage. Yolk flavour and egg odour scores decreased from day 5, but were unacceptable on day 18. Albumen texture did not improve, being tough and rubbery. Yolk surface became extremely dark green on day 3, but the discoloration disappeared after day 10. AA

1179

Sreevani (M) and Krishna Kumar. **A qualitative study of shelled eggs marketed in and around Hyderabad.** *Poultry Guide* 31(6); 1994; 71-73

Egg wt., shell thickness, shape index, Haugh unit score, Albumen and yolk indices were determined for 200 shelled eggs marketed from 5 different channels in and around Hyderabad, India, during November, 1991 to February, 1992. The mean values for the above were 51.6 g, 0.04 mm, 75.43%, 96.4, 0.084 and 0.39 respectively. Incidence of dirty eggs, cracks, blood and meat spots were 10.5%, 15.2%, 10 and 30% respectively. Physical composition of shelled egg were 11.2, 59.952% and 28.96% for shell, albumen and yolk respectively. Good quality shell eggs were supplied in Hyderabad. AA

1180

Rossi (M), Spedicato (E) and Albania (V). **A normal-phase HPLC method for analysis of total cholesterol in eggs.** *Italian Journal of Food Science* 5(2); 1993; 151-155

A normal-phase HPLC method for detn. of cholesterol in egg-yolk powder was developed. The method, which uses pregnenolone as an internal standard, was investigated for linearity, reproducibility, recovery and limit of detection. BV

1181

Oetles (S) and Hisil (Y). **High pressure liquid chromatographic analysis of water soluble vitamins in eggs.** *Italian Journal of Food Science* 5(1); 1993; 69-73

An ion-paired reverse-phase HPLC method was modified for the detn. of individual water soluble vitamins (vitamins B_2, B_6, niacin and folic acid) in eggs. The modified HPLC system consisted of a μ-Bondapak C18 column, a solvent system of water-methanol (78:22 v/v)-PIC B6 (2.4 x 10^3M), a flow rate of 0.3 μl/min and a UV detector. Recoveries of 102.3, 97.5, 98.9 and 92.5% were obtained for vitamins B_2, B_6, folic acid and niacin, respectively, in all egg samples. AA

1182

Conrad (KM), Mast (MG), MacNeil (JH) and Ball (HRJr). **Composition and gel-forming properties of vacuum-evaporated liquid egg white.** *Journal of Food Science* 58(5); 1993; 1013-1016

Liquid egg-white (LEW) was evaporated under vacuum (4.7 kPa) in a water-jacketed vessel to produce a concentrated, LEW product, 3 water-jacket temp. (40, 50 and 60 °C) and 4 processing times (0, 30, 45 and 60 min). For the 60°C, 60-min treatment, solids content increased (P less than or equal to 0.05) from 11.5 to 21.8% Concn. did not affect true gel strain (P greater than or equal to 0.05), but gel shear stress increased (P less than or equal to 0.05) with increased solids concn. SRA

1183

Conrad (KM), Mast (MG), Ball (HR), Froning (G) and MacNeil (JH). **Concentration of liquid egg white by vacuum evaporation and reverse osmosis.** *Journal of Food Science* 58(5); 1993; 1017-1020

Effects of concn. of liquid egg whites by reverse osmosis (RO) and vacuum evaporation (VE) on physical and chemical properties of egg whites were evaluated. Effects of food additives guar gum (GG) and sodium lauryl sulphate (SLS) on the concentrates produced by RO and VE were also determined. The treatments consisted of a control, RO process, VE process using 50°C water-jacket temp. and 60-min processing time (5060VE) and a VE process using 60°C water-jacket temp. and 45-min processing time (6045VE). Solids contents for the concentrates were 17.82% for the RO, 17.41% for the 6045VE and 18.98% for 5060VE. The VE product had better foaming properties and comparable gel qualities to that of the RO product. Addition of GG or SLS improved the quality of all concentrates. Electrophoretic studies indicated a significant decrease in globulins A1 and A2 in the VE treatments. SRA

SEAFOODS

1184

Swamy (PK). **Opportunities for exporting marine products to the USA.** *Seafood Export Journal* 25(15); 1994; 21, 23, 25, 28-29, 31-32, 35, 37, 39-40

Reviews global trade in seafoods (shrimps, tunas, ground fish, small pelagics, cephalopods, salmon, fishmeal and fish oil); status of seafood market in USA; status of Indian fisheries in the world scenario; statewise marine fish landings in India; export performance of marine products from India; countrywise export of marine products from India; itemwise exports from India; measures to increase export opportunities to USA: and investment policies in fisheries. GS

1185

Jayaraman (R). **Exports of marine products does not affect domestic consumption.** *Seafood Export Journal* 25(16); 1994; 23, 27, 29

Indian export of fresh/frozen fish rose from 7.66% in 1986-87 to 20.22% in 1992-93. In 1993-94, export of ribbon fish, reef cod, red snapper, white snapper, ghol and mackerel showed 7% increment over that of 1992-93. However hardly two-third of marine fish potential available only is exploited and hence inland fish production should be boosted with aquaculture. GS

Fish

1186

Feeney (RE) and Yeh (Y). **Antifreeze proteins: properties, mechanism of action, and possible applications.** *Food Technology* 47(1); 1993; 82, 84-88, 90

The protein properties of antifreeze proteins found in polar fish, cold-tolerant insects and plants, its effect on freezing and melting temp. and the possible practical applications of antifreeze proteins in agricultural and food industries such as recrystallization inhibition, protecting non-polar fish, agricultural crops and possible usage in foods are described. CSA

1187

Thakur (BR) and Patel (TR). **Sorbates in fish and fish products - a review.** *Food Reviews International* 10(1); 1994; 93-107

This report reviews and summarizes studies that have tested sorbates alone or in combination with other compounds, techniques in extending the shelf-life of fish and fish products. Methods of application, effects on shelf-life, microbial flora, chemical changes and sensory quality of fish are the aspects included. 95 references. SRA

Shrimps

1188

Gagne (N) and Simpson (BK). **Use of proteolytic enzymes to facilitate the recovery of chitin from shrimp wastes.** *Food Biotechnology* 7(3); 1993; 253-263

Two proteolytic enzymes (chymotrypsin [EC 3.4.21.1] and papain [EC 3.4.22.2]) were used to hydrolyse proteins associated with demineralized shrimp waste (SW) to recover chitin. Conditions used were optimized using response surface methodology. Factors studied were temp. (25-40°C for chymotrypsin, 25-47°C for papain), pH (6.5-9.1 for chymotrypsin, 6.8-8.8 for papain) and enzyme to waste ratio (E/W ratio) (2:1000-10:1000 for chymotrypsin, 2:1000-18:1000 for papain). Of these, pH was the most important factor in the models obtained. Optimum conditions for deproteination by chymotrypsin were determined to be approx. 40°C, pH 8.0 and E/W ratio 7:1000 (w:w). For papain, a temp. of approx. 38°C, pH 8.7 and E/W ratio 10:1000 (w:w) gave the optimum response. Under these conditions, the protein yield was max., 22-48% depending on the starting material. Residual protein levels in the SW after enzymic deproteination were very low, i.e., 1.3 and 2.8% for chymotrypsin and papain-treated samples respectively. BV

Cod

1189

Chan (JK), Gill (TA) and Paulson (AT). **Thermal aggregation of myosin subfragments from cod and herring.** *Journal of Food Science* 58(5); 1993; 1057-1061, 1069

Turbidity of fish myosin subfragment solutions increased with temp., except cod (*Gadus morhua*) heavy meromyosin turbidity, which leveled at temp. > 45°C. Extent of aggregation and number of cross-linking sites for cod heavy and light meromyosins were significantly higher than for herring (*Clupea harengus*) ($P < 0.05$), but only at temp. > 35 and 45°C, respectively. Thermal aggregation ability increased linearly with increased surface hydrophobicity (So) for the myosin subfragments, except for cod heavy meromyosin where the increase in So between 45-55°C did not correspond to an increase in cross-linking ability. The lessened aggregation ability of herring myosins may be due to the low cross-linking of the heavy meromyosin (S-2) region. SRA

Mackerels

1190

Kumazawa (Y), Seguro (K), Takamura (M) and Motoki (M). **Formation of ε-(γ-glutamyl) lysine cross-link in cured horse mackerel meat induced by drying.** *Journal of Food Science* 58(5); 1993; 1062-1064, 1083

The cross-linking reaction of myosin heavy chain and formation of epsilon-(gamma-glutamyl)lysine bonds in salt cured meat from horse mackerel during drying were investigated. Transglutaminase involvement in manufacture of Himono (dried fish) and Kamaboko (fish cake) was also studied. Block meat cut from horse mackerel was cured in 3M NaCl (pH 7.5) in the presence and absence of 5mM EDTA (to remove Ca ions from solution) for 3 h at 4°C. During drying at 30°C, changes in the myosin heavy chain and ε-(γ-glutamyl)lysine isopeptide bonds in the meat were observed. After 20 h drying, cross-linking of myosin heavy chain was observed and ε-(γ-glutamyl)lysine bonds increased 8 fold. These changes were inhibited in the presence of EDTA (suggesting that Ca ions were essential for cross-linking of heavy myosin chain). Results suggest that transglutaminase may be involved in the cross-linking reaction of the myosin heavy chain in the manufacture of *Himono* in Japan. BV

Whiting

1191

Hsu (CK), Kolbe (E), Morrissey (MT) and Chung (YC). **Protein denaturation of frozen Pacific whiting (*Merluccius productus*) fillets.** *Journal of Food Science* 58(5); 1993; 1055-1056, 1075

Protein denaturation in Pacific whiting (*M. productus*) fillets stored at -8, -20, -34 and -50°C was investigated over a 10-month period by salt-soluble protein extractability (SSPE), Ca^{2++}-ATPase activity and the torsion test. Quality of fillets stored at -8°C were significantly greater than those of fillets stored at lower temp. Fillets stored at -34 and -50°C showed no significant change over those stored at -20°C as measured by SSPE and Ca^{2++}-ATPase activity. However, fillets stored at the lower temp. had slightly higher torsion shear strain. SRA

1192

Morrissey (MT), Wu (JW), Lin (D) and An (H). **Protease inhibitor effects on torsion measurements and autolysis of Pacific whiting surimi.** *Journal of Food Science* 58(5); 1993; 1050-1054

Beef plasma protein (BPP), egg white (EW) and potato extract (PE) (1, 2, 3 and 4%) were tested for their ability to inhibit proteolysis in fish mince and surimi made from Pacific whiting (*Merluccius productus*). Strong inhibition resulted from all 3 compounds in fish mince when measured by autolysis. However, when tested in surimi significant differences occurred among the compounds. BPP showed strongest inhibition of proteolytic effect (1% BPP increased shear strain by 70%, with further increases at higher concn.) followed by EW and PE when measured by autolysis, gel electrophoresis and torsion. Results suggest that BPP was an effective proteinase inhibitor in surimi at a concn. as low as 1%, preventing degradation of high mol. wt. proteins important for gelation. BV

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

1193

Kinsella (JE), Frankel (E), German (B) and Kanner (J). **Possible mechanisms for the protective role of antioxidants in wine and plant foods.** *Food Technology* 47(4); 1993; 85-89

Physiological mechanisms by which flavonoids, phenolics and other phytochemicals in wine and plant foods prevent or ameliorate some common chronic diseases are discussed in this article. CSA

1194

Mazzoleni (V) and Colagrande (O). **Composition of bottle-fermented Italian sparkling wines.** *Italian Journal of Food Science* 5(2); 1993; 129-137

212 samples of bottle-fermented Italian sparkling wines were analysed for volatile compounds, ethanol, sugars, pH, acidity, SO2, sugar-free extract, ash, tartaric acid, malic acid, lactic acid, total nitrogen, glycerol, minerals and internal pressure. There was little variability in ethanol, pH, acidity, sugar-free extract and internal pressure, showing that present-day technologies are able to control the major traits of these wines. Contents of some volatile compounds were highly variable, indicating that they might contribute to the character of examined sparkling wines. BV

1195

Mannino (S) and Martignoni (E). **Sugar determination in musts and wines with a flow system and amperometric detection at constant potential with a chemically modified electrode.** *Italian Journal of Food Science* 5(1); 1993; 37-41

A flow injection system is described for the detn. of sugars in wines. The system is based on amperometric detection at a Nafion-copper modified electrode operating at constant potential (+0.5 V). To eliminate possible interferences, a clean-up step was performed by using a sorbent extraction procedure with CH and SAX Bond Elut cartridges. The system was capable of detecting total sugars in musts and wines at a throughput of 15 samples/h. Comparison with the European Official method showed a correlation coeff. of 0.99. AA

1196

Ravaglia (S) and Delfini (C). **Production of medium chain fatty acids and their ethyl esters by yeast strains isolated from musts and wines.** *Italian Journal of Food Science* 5(1); 1993; 21-36

The ability of 48 yeast strains to produce medium chain fatty acids and their respective ethyl esters in a synthetic nutrient medium was verified; amounts produced in 44 Italian wines were also analysed. A reliable, fast and effective method of extraction was used. There was a greater amount of fatty acids in white than in red wines; there was also a greater quantity produced in wines which underwent stuck fermentation, in comparison to those that fermented normally or were treated with charcoal. Fatty acid production was dependent on the yeast strain: almost no fatty acids were produced by *Zygosaccharomyces bailii* 1, *Kloeckera apiculata* 1 and *Schizosaccharomyces japonicus* 5; *Saccharomyces cerevisiae* var. *cerevisiae* and *S. cerevisiae* var. *bayanus* produced large quantities (from 0.9 to 3.7 mg/l of C8); and *S. cerevisiae* var. *cerevisiae* 193 produced the greatest quantity (about 7 mg/l of C8). Acetaldehyde, acetic acid and pyruvic acid production was evaluated in 2 yeast strains. Linear regression analysis showed a correlation among caprylic acid, ethyl caprylate, ethyl caprate and acetic acid production. AA

1197

Herraiz (T), Huang (Z) and Ough (CS). **Amino acids and ethyl esters of amino acids in sparkling and 'sur lie' wines.** *Italian Journal of Food Science* 5(1); 1993; 11-20

The amount of amino acids and amino acid ethyl esters was determined in some sparkling wines and in table wines maintained in the presence of the yeast lees ('sur lie' wines). Results show an increase in both series of compounds with yeast contact. The ethyl esters of the amino acids increased during the secondary fermentation in sparkling wines. A greater amount of both proline ethyl ester and gamma-aminobutyric ethyl ester was observed in the older sparkling wines. AA

Non-alcoholic beverages

1198

McNeill (VL) and Schmidt (KA). **Vanillin interaction with milk protein isolates in sweetened drinks.** *Journal of Food Science* 58(5); 1993; 1142-1144, 1147

The impact of heat processing and emulsifier addition on the interaction of vanillin and sodium caseinate or vanillin and whey protein isolate was examined in a model system. Free vanillin in the protein drink was evaluated by a sensory panel and HPLC. Sensory analysis indicated that emulsifier, heat x protein and heat x emulsifier interaction significantly ($P < 0.05$) affected perception of vanillin flavour. Solutions with added egg yolk solids had highest vanillin flavour intensity. Heating caused a significant increase in vanillin flavour intensity in whey protein isolate, but not in sodium caseinate solutions. Analysis of free vanillin by HPLC indicated that sodium caseinate interacted more with vanillin than did whey protein isolate. No correlation was found between sensory and HPLC results. SRA

Fruit juices

Raspberry juices

1199

Boyles (MJ) and Wrolstad (RE). **Anthocyanin composition of red raspberry juice: influences of cultivar, processing, and environmental factors.** *Journal of Food Science* 58(5); 1993; 1135-1141

The anthocyanin and anthocyanidin pigment profiles of 46 authentic red raspberry juice (RRJ) samples were determined by HPLC. Total anthocyanin pigment content and % polymeric colour were also determined. This generated a database incorporating influences of cv., geographic origin, maturity, processing and fungal contamination. Cv. exhibited characteristic patterns distinguished by quantitative rather than qualitative differences. Total pigment ranged from 4 to 1102 mg/l. Commercial RRJ concentrates (14) were also analysed. 2 were shown to be adulterated because of the presence of delphinidin glycosides. 3 samples contained high amounts of polymerized pigments, indicating a history of processing or storage abuse. AA

FATS AND OILS

1200

Anon. **Pigmented codes for the food and beverage industry.** *Confectionery Production* 59(1); 1993; 66-67

Describes the use of Videojet's Excel P inkjet printer which can apply a range of pigmented inks to any surface, porous or non-porous, smooth or curved, at most required production line speeds (up to 916 ft/min). The printer delivers a clear, crisp and near letter quality, bright code on any dark surface. The operation of the new Videojet DigiMark Laser Coder (Version 3.15°C), which offers manufacturers indelible coding on to virtually any surface at low cost, is also described. Its range of features and customer benefits are stressed. CSA

Oils

Flaxseed oils

1201

Ranhotra (GS), Gelroth (JA), Glaser (BK) and Potnis (PS). **Lipidemic responses in rats fed flaxseed oil and meal.** *Cereal Chemistry* 70(3); 1993; 364-366

In a 6-wk study, diets prepared with full-fat flax seed meal (FM), defatted-FM (restored to full-fat level with a hard fat or isolated flaxseed oil[FO]) or just FO were compared for their effect on blood lipid levels. Hypercholesterolaemic rats were used as the test model. FM greatly negated the adverse effect of hard fat (hydrogenated soybean oil) on serum total cholesterol (CH) and serum non high-density lipoprotein CH. FM also accentuated the CH-lowering effect of isolated FO. Liver CH levels were quite elevated, especially in rats fed the diet not containing FM. Liver lipid levels ranged between 16 and 31%. Serum triglyceride levels were in the normal range and no lowering effect due to FM or FO was observed. AA

Palm oils

1202

McNeill (GP) and Berger (RG). **Enzymatic glycerolysis of palm oil fractions and a palm oil based model mixture: relationship between fatty acid composition and monoglyceride yield.** *Food Biotechnology* 7(1); 1993; 75-87

In this paper changes in the glyceride fractions which occur during enzymic glycerolysis of palm oil-based fats were examined. Palm oil, palm stearin, palm olein and mixtures of palm stearin with rapeseed oil were reacted with glycerol at low moisture content using lipase from *Pseudomonas fluorescens* as catalyst. The content of monoglyceride (MG) in the reaction mixture at equilibrium was found to be higher at lower temp. except for palm stearin where a higher diglyceride (DG) content was obtained. High temp. GC analysis revealed that at lower reaction temp. the predominant reaction product was monopalmitin or, in the case of palm stearin, dipalmitin. Separation of the MG and DG fractions followed by detn. of the fatty acid composition showed that at higher reaction temp. the fatty acids were randomly distributed in these fractions, but at 30-40°C the saturated fatty acids were preferentially located in the MG fraction. A strong positive correlation was found between saturated fatty acid content and yield of MG at lower reaction temp. BV

SPICES AND CONDIMENTS

Spices

Saffron

1203

Tsimidou (M) and Tsatsaroni (E). **Stability of saffron pigments in aqueous extracts.** *Journal of Food Science* 58(5); 1993; 1073-1075

Effects of pH, light, temp. and O_2 on the stability of saffron (*Crocus sativus*) pigments (SP) in aqueous extracts were studied. First-order kinetics for degradation of SP under all experimental conditions (pH 3, 5 and 7; temp. 4, 25, 40 and 62°C; under light or dark conditions; in O_2 or reduced O_2 atm.) were observed. Kinetic data were calculated from the values of the colouring power of saffron aqueous extracts. BV

SENSORY EVALUATION

1204

Tamura (MS), Shoemaker (CF) and Henderson (JM). **Performance of the helical screw rheometer for fluid food suspensions.** *Journal of Food Science* 58(5); 1993; 1172-1175

A comparative study of the helical screw rheometer (HSR) measurements with those obtained from a rotational rheometer with cone and plate fixtures were performed to evaluate the accuracy and precision of the HSR. The HSR consists of a helical screw enclosed in a tight fitting cylinder. When the screw is rotated with the system closed it generates a linearly increasing pressure differential along the axis of the screw. The pressure is proportional to the viscosity of a Newtonian fluid. Viscosity of standard Newtonian fluids measured using the HSR correlated well with measurements on a rotational rheometer with cone and plate fixtures. HSR data on non-Newtonian suspensions analysed with a power law model ($\sigma = m\gamma^n$) did not agree as well with results from cone and plate fixtures on the rotational rheometer. BV

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1205

Sorensen (AA). **Integrated pest management: Finding a new direction.** *Cereal Foods World* 38(4); 1993; 187-188, 190-192, 194, 196

Integrated pest management is being evaluated as an alternative to the current use of pesticides. Questions about certification, pesticide reduction targets, environmental and health risk assessments, and incorporation of HACCP principles are explained. CSA

1206

Kenkel (P), Criswell (JT), Cuperus (GW), Noyes (RT), Anderson (K), Fargo (WS). **Stored product integrated pest management.** *Food Reviews International* 10(2); 1994; 177-193

Review. 26 references. SRA

BIOCHEMISTRY AND NUTRITION

1207

Swarnkar (VK), Chouhan (AS) and Kushwah (RS). **Impact of instructional television programmes on women's knowledge and attitude towards nutrition and home practices.** *Madras Agricultural Journal* 81(2); 1994; 75-77

Two groups of women (1) viewed (50 women) and (2) non-viewed (50 women) of the age group 17-50 yr were selected randomly to compare the knowledge and attitude on nutrition, food preservation, food adulteration and health education. Overall impact of TV programmes on viewers was better than those of non-viewers. No specific role of sociopersonal and economic characteristics influenced the attitude of these 2 groups with respect to home and nutrition practices. GS

1208

Black (RM). **Sucrose in health and nutrition - facts and myths.** *Food Technology* 47(1); 1993; 130-133

The article clarifies the notions that sugar consumed in excess, contributes to hyperactivity and can lead to obesity, diabetes, cataracts, hardening of the arteries and other diseases are myths and not facts. CSA

1209

Mermelstein (NH). **Nutrition labelling in foodservice.** *Food Technology* 47(4); 1993; 65-68

Describes the labelling regulations as they pertain to food service operations and tells how the major foodservice chains are providing nutritional information to their customers. CSA

1210

Marcoe (KK) and Haytowitz (DB). **Estimating nutrient values of mixed dishes from label information.** *Food Technology* 47(4); 1993; 69-70, 72, 75

This article discusses a method which accurately calculates the nutrient value of a food without requiring complete analytical data. CSA

1211

Jenkins (MLY). **Research issues in evaluating "Functional foods".** *Food Technology* 47(4); 1993; 76, 78-79

The article provides a broad overview of some of the factors that may influence research studies on the nutritional efficacy and safety of functional foods and identifies some of the problems that may be encountered in conducting these studies. These factors include guidelines governing the execution of studies; experimental design; test substances and compounds (selection, characterization, suitable standards); stability, homogeneity and acceptable levels of test substances and compounds in diet; control of nutritional and other dietary variables; preparation of animals for euthanasia; and statistical evaluation. CSA

1212

Kurzer (MS). **Planning and interpreting "Designer food" feeding studies.** *Food Technology* 47(4); 1993; 80, 82-84

Human feeding study on the effects of flaxseed on estrogen exposure is discussed and it emphasizes the need for caution in making dietary recommendations. CSA

TOXICOLOGY

1213

Mohan (B) and Chandrasekaran (D). **Effect of aluminium silicate in ameliorating the toxicity of aflatoxin in commercial layers.** *Poultry Guide* 31(7); 1994; 37-39

Hydrated sodium calcium aluminosilicate when added to layer feed reduced the ill effects of aflatoxin B_1 and improved the performance of birds by maintaining the feed intake, egg production and reduced the incidence of breakage from 0.4 to 0.2% and leathery eggs. GS

FOOD LAWS AND REGULATIONS

1214

McNamara (SH). **FDA rules concerning 'light'/'lite' claims.** *Manufacturing Confectioner* 73(5); 1993; 47-49

1215

Seguine (ES). **Nutrition labeling. Nutrition Labeling and Education Act of 1990 (NLEA). Review of the final regulations published January 6, 1993.** *Manufacturing Confectioner* 73(3); 1993; 89-108

Provisions of the USA Nutrition Labeling and Education Act of 1990 are outlined and areas of particular concern to the confectionery industry are considered. Aspects covered include: effective date; label format; exemptions and special conditions; serving sizes and servings per container; daily values, DRVs, RDI and RDA; FDA compliance procedures for nutritional labels; compliance when using databases; CMA/NCA/RCI data base initiative; and other issues. CSA

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GENERAL

1216

Dick (JJ). **ISO 9000 and HACCP: A definite role in the Indian food industry.** *Indian Food Industry* 12(6); 1993; 16-18

This article deals with Hazard Analysis Critical Control Points (HACCP) and its role within ISO-9000 and is intended to prompt and confirm the value of HACCP and its role within ISO-9000 to companies in the Indian food industry. CSA

1217

Agarwal (SR). **Quality improvements of food products by SSI units.** *Indian Food Industry* 12(6); 1993; 19-22, 25

Quality improvements can basically be achieved through institution of formal meetings, change of old habits/atitudes, sharing of experience, formal training and such other actions. The above tools and techniques of behavioural skills can be applied to any small scale industry for overall improvement of not only quality of manufactured food products but quality of life as well. CSA

1218

Ferris (DA), Shanklin (CW) and Flores (RA). **Solid waste management in food service.** *Food Technology* 48(3); 1994; 110-113, 115

This article presents the current available information on food packaging waste, ascertains the amount and type of waste being generated and reports the results of two recently completed waste stream analyses at Kansas State University. CSA

1219

Raghuramaiah (B). **Flavours for food industry.** *Beverage and Food World* 21(3); 1994; 11-13

1220

O'Donnell (C). **The science of convenience.** *Prepared Foods* 162(1); 1993; 38-40

Development of convenience foods (CFs) in terms of formulation, packaging and structure is described. Aspects covered include: reasons for the need for CFs; popularity of packaged meals for children; areas with potential for growth in sales (convenience poultry, fish and meat products; sous-vide foods; chilled foods; and toaster pastries); CF food outlets; distribution of CFs and its effect on product quality; and food safety trends. BV

1221

Pedi (R) and Moesta (R). **Total quality in product development.** *Prepared Foods* 162(2); 1993; 44-46

Discusses the use of Total Quality Management in food product development. Aspects covered include: defining the scope of research and development (product design, defining objectives, improved communications); levels of quality in product development; Quality Function Deployment; and Taguchi methods. BV

FOOD PROCESSING

1222

Shaw (A), Mathur (P) and Mehortra (NN). **Food processing: A scenario.** *Indian Food Packer* 47(3); 1993; 5-15

The history of food processing industry in India, its scope and status; fruit and vegetable based products; targets and achievements of food processing sector during the plans; number of licensed units and installed capacity; and factors influencing the growth of food processing industry are discussed. GS

1223

Chaudhari (AP), Kumbhar (BK), Singh (BPN) and Narain (M). **Osmotic dehydration of fruits and vegetables - A review.** *Indian Food Industry* 12(1); 1993; 20-27

Reviews the advantages and disadvantages of osmotic dehydration (OD), its application to fruits and vegetables, the process of OD, the factors that effect the rate of moisture removal (variety, pretreatment, osmotic agent, process temp., agitation/circulation, solution to sample ratio, time of treatment, size and shape of the sample), treatments after OD, mass transfer and the economy in using OD. 42 references. CSA

1224

Anon. **Pasteurization revisited.** *Prepared Foods* 162(2); 1993; 49-50

Two new 'cold' pasteurization techniques available to the food industry, ultra-high pressurization pasteurization (UHPP) and electric impulse poration pasteurization (EIPP), are described. With UHPP, the pressure treatment destroys the cellular integrity of microorganisms without detrimentally affecting heat labile flavour compounds, vitamins and other essential components. Examples of ultra-high pressurization pasteurized foods include: highly spreadable jams with innate fresh flavours; non-bitter grapefruit juice, with debittering incurred via inhibition of limonene production; and rapidly tenderized meats. With EIPP, liquid foods are passed through very narrow orifices across which are passed high voltage electric pulses. The electric pulses inactivate microorganisms by electroporation. BV

1225

Davey (KR). **Extension of the generalized sterilization chart for combined temperature and pH.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 476-479

Describes a generalized procedure for prediction of the exposure time necessary for sterilization of foods, as influenced by combined temp. and pH. The sterilization temp. used were chosen to simulate conditions used in commercial processing (110, 115 and 120°C). The procedure is illustrated using inactivation of *Clostridium botulinum* in a range of foods (spaghetti, tomato sauce and cheese; macaroni creole; and spanish rice). Results demonstrate the necessity of including pH as an environmental factor in the detn. of an appropriate sterilization process. Results also demonstrate that this practical method should provide a convenient tool for assessment of the necessary sterilization designs. BV

FOOD PACKAGING

1226

Katan (L). **The greening of the British packaging industry.** *Indian Food Packer* 47(3); 1993; 63-65

Outlines the environmental problems of food packaging in Britain; proposed directive by the European Commission; the advisory role of Industry Council for Packaging and the Environment; new raw materials developed; modification of products and packages developed. GS

1227

Anon. **Weight control: it's in the bag.** *Prepared Foods* 162(2); 1993; 75-76

Vertical form-fill-seal systems coupled with computer controlled weight delivery systems are described, which can produce filled packs at high speeds while minimizing product waste in the form of underweight rejects. Selection of a delivery system (which depends on the product's physical properties and economics); wt. control of products that are not uniform in size or shape (jelly beans, cut vegetables, shredded cheese, potato chips, frozen chicken legs, fish fillets); system control software (controlling selection of the correct hoppers for net wt.); form-fill-seal equipment; bag styles (pillow pouch, standard fin seal, lap seal); and control of film handling are the aspects covered. BV

1228

Seonggyun (S) and Bhowmik (SR). **Determination of thermophysical properties of plastic cans used for thermal sterilization of foods.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 400-405

Values of the surface heat transfer coeff. for heating and cooling media, thermal diffusivity of the plastic wall and plastic wall-to-food conductance were simultaneously estimated using a numerical model together with a multivariate optimization technique. Model-estimated and experimentally determined temp. profiles at several locations inside the plastics cans filled with a conduction-heated food simulant were used. Nutrient retention, sterilizing values and processing times for foods processed in cylindrical plastics cans were determined using the estimated thermophysical property values. Influence of the thermophysical properties on temp. response and nutrient retention in the food was also studied. BV

FOOD ENGINEERING AND EQUIPMENT

1229

Ramaswamy (HS), Abbatemarco (C) and Sablani (SS). **Heat transfer rates in a canned food model as influenced by processing in an end-over-end rotary steam/air retort.** *Journal of Food Processing and Preservation* 17(4); 1993; 269-286

Effects of various factors on heat transfer rates of a canned food model (gelatinized starch) were evaluated during thermal processing in an agitating retort. Process variables were retort temp. (110-130°C), rotation speed (10-20 rpm), can headspace (6.4-12.8 mm) and starch concn. (3-4%). Thermal process parameters (heating rate index, f_h, and heating lag factor, j_{ch}) and the resulting process lethality, F_o and cook value, C_o were obtained from time-temp. data obtained during processing for 3 consecutive runs. Rheological properties and colour were experimentally evaluated both before and after each run. Overall heat transfer coeff. (U_o) was calculated from the heating rate index using a lumped capacity approach. The study indicated that f_h, j_{ch}, F_o and C_o were influenced (P less than 0.05) by all process variables except can headspace. U_o was related to retort temp., rotation speed and initial apparent viscosity. The best dimensionless correlation for U_o was Nusselt number (logarithmic scale) vs specific apparent viscosity and Froude number ($R^2 = 0.65$). AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1230

Giese (J). **Modern alchemy: Use of flavours in food.** *Food Technology* 48(2); 1994; 106-108, 110, 112-116

The article provides an overview of the terminology and classification of flavour into various categories (fruit extracts and juice concentrates, natural flavours, spices (essential oils and essences, oleoresins), process flavours, aromatic compounds and artificial flavours); different forms of flavours (solid, semisolid/paste and liquid); storage; labeling of flavours; safety and application of flavour ingredients in specific product areas such as low-fat foods, beverages, dairy products, meat products, mayonnaise and salad dressings. CSA

1231

Mei Chin (Y) and Faustman (C). **Influence of temperature, pH, and phospholipid composition upon the stability of myoglobin and phospholipid: a liposome model.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 853-857

An oxymyoglobin (OxyMb) was used to study effects of temp., pH, phospholipid (PL) polar head group and fatty acid composition on OxyMb and PL oxidation (TBA). Both oxidations were enhanced by increased temp. (37 > 20 > 10 > 4°C) and decreased pH (5.6 > 6.4 > 7.2) ($P < 0.05$). OxyMb and PL oxidation in OxyMb-liposomes prepared from commercial PL followed the order phosphatidylserine (PS) > phosphatidylethanolamine (PE) > phosphatidylcholine (PC) ($P < 0.05$). Since both PL polar head group and fatty acid composition were believed to affect stability of OxyMb and the PL bilayer, PC and PE with defined fatty acids at Sn1 = 16:0 and Sn2 = 18:2 or 20:4 were used to construct OxyMb-liposomes. When fatty acid composition was held constant, PE-based OxyMb-liposomes showed a greater increase in both oxidations than PC-based OxyMb-liposomes ($P < 0.05$). When the PL polar head group was held constant, increased chain length and unsaturation of fatty acids resulted in greater OxyMb and PL oxidation ($P < 0.05$). The in vitro model provided evidence that OxyMb and PL oxidations are interrelated. AA

1232

Fukamachi (M), Matsui (T), Shimoda (M), Nakashima (M) and Osajima (Y). **Sorption depression of flavors into modified EVA film by lowering film-flavor affinity.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 929-932

Surface hydrolysis of EVA film resulted in specific sorption depression behaviour of volatile compounds. Sorptions of hydrocarbons, ethyl octanoate and decanal into hydrolysed EVA film were depressed; sorption of alcohols was promoted. To elucidate the phenomena, the solubility parameter (SP) concept was introduced. From plots of sorptions against SP values of volatile compounds, for all hydrocarbons, ethyl esters and aldehydes with the cohesive energy of < 19.3 SP, sorptions were depressed; for hexanal and alcohols with SP values of > 19.3 the opposite results were obtained. The depression effect may be attributed to lowering of compatibility at the surface between the hydrolysed film and volatile compounds. Sensory evaluation illustrated that hydrolysed EVA film preserved the flavour of lemon juice. AA

1233

Kubo (I), Muroi (H), Himejima (M), Yamagiwa (Y), Mera (H), Tokushima (K), Ohta (S), Kamikawa (T). **Structure-antibacterial activity relationships of anacardic acids.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 1016-1019

A series of anacardic acids [an antimicrobial agents in cashew nuts] possessing different side-chain lengths was synthesized and antimicrobial activity was tested. Anacardic acid with a C_{10} alkyl side chain was most active against Staphylococcus aureus, while against *Propionibacterium acnes*, *Streptococcus mutans* and *Brevibacterium ammoniagenes*, the anacardic acid possessing the C_{12} alkyl side chain was most effective. AA

1234

Estrada (P), Baroto (W), Castillon (MP), Acebal (C) and Arche (R). **Temperature effects on polyphenol oxidase activity in organic solvents with low water content.** *Journal of Chemical Technology and Biotechnology* 56(1); 1993; 59-65

The effect of temp. on polyphenol oxidase immobilized on glass beads was studied in organic solvents. Optimum temp. for catalysis depended on the solvent and varied from 26°C for dichloromethane to 50°C for toluene, benzene and 1,1,1-trichloroethane. Optimum temp. and activation energy were independent of the water content of the system whereas inactivation energies decreased as the water content of the system was decreased. The enzyme was stable in toluene up to 50°C although residual activity depended on the water content of the system. Thermoinactivation of polyphenol oxidase in toluene gave an activation energy for enzyme decay of 11.5 kcal mol^{-1} which is consistent with a conformational process. Among the agents employed to protect the enzyme against thermal denaturation 1% (w/v) short-chain polyols added to the buffer and 0.5 mmol dm^{-3} *p*-nitrophenol added to toluene more than doubled the half-life of the enzyme. AA

1235

Greener (D-I) and Fennema (O). **The effects of plasticizers on crystallinity, permeability, and mechanical properties of methylcellulose films.** *Journal of Food Processing and Preservation* 17(4); 1993; 247-257

Effects of plasticizers (polyethylene glycols (PEG) 400, 1450, 8000 and 20 000, glycerol (G) and propylene glycol (PG)), 30% dry basis, on the physical properties of methylcellulose (MC) films were investigated. With the exception of PG, plasticizers with low mol. wt. (G and PEG 400) caused the largest increase in the d101 spacing of the crystal lattice. All plasticizers significantly ($\alpha = 0.05$) increased oxygen (O_2P) and water vapour permeabilities (WVP) of the films as compared to that of unplasticized MC, with PEG 400 having the greatest effect on O_2P and G having the greatest effect on WVP. With the exception of PG, all plasticizers decreased the tensile strength of MC films, with PEG 400 causing the largest decrease. With the exception of PG and PEG 400, all plasticizers increased percent elongation values of MC films, with PEG 1450 having the greatest effect. Glycerol and PEG were the most effective plasticizers for MC. The higher mol. wt. plasticizers do provide some plasticizing properties and may be suitable for applications that require a lower permeability to water vapour than can be achieved with glycerol. AA

1236

Greener (D-I) and Fennema (O). **The effects of solution composition and drying temperature on crystallinity, permeability and mechanical properties of methylcellulose films.** *Journal of Food Processing and Preservation* 17(4); 1993; 231-246

Effects of film drying temp. (100°C for 35 min, 80°C for 1 h, 50°C for 1.5 h or room temp. overnight) and ethanol concn. (0, 25, 50 or 75%) in the aqueous film solution on the physical properties of methylcellulose (MC) films were investigated. Increased drying temp. increased crystallinity in all films. MC films prepared from a 75% water-25% ethanol solvent exhibited smaller permeabilities to oxygen and water vapour, greater crystallinity (when the higher drying temp. were used), greater tensile strength, and greater percent elongation than films prepared from other water or water/ethanol solvents. Ethanol, at a 25% concn., may enhance intermolecular hydrogen bonding of MC, while higher concn. of ethanol may have prevented complete hydration of MC. Extensive association of MC by hydrogen bonding and hydrophobic association (which induces crystallization) likely reinforces the film matrix and presumably produces a film with greater resistance to oxygen and water vapour. AA

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

1237

West (SI). **A review of the commercial carbohydrase market.** *Journal of Chemical Technology and Biotechnology* 56(4); 1993; 416-417

This paper was first presented at the International Conference on the Enzymatic Synthesis and Modification of Carbohydrates held on 1-3 July, 1992 in Warwick, UK. An overview of the markets for carbohydrases during the 1980s is given. Information is included on enzyme use in baking, olive oil processing, animal feed manufacture and textiles production. BV

1238

Pifferi (PG), Bonora (V), Spagna (G) and Tramontini (M). **Immobilization of catalase on macromolecular supports activated with acid dyes.** *Process Biochemistry* 28(1); 1993; 29-38

Immobilized catalase (EC 1.11.1.6) has potential applications in food processing (removal of hydrogen peroxide from milk and in the sterilization of liquids). Immobilization of catalase on a range of natural and synthetic macromolecular supports (chitosan, wool, silk, amberlite, nylon 6, polyvinylpyrrolidone) was investigated. The supports were undyed or activated by dying with sulphonic and carboxylic anionic dyes (Cibacron Blue F3G-A and Erythrosin). Immobilization yield and activation yield were considerably influenced by dye activation. The most promising system was nylon 6 activated by dying with Cibacron Blue. The binding capacity of this activated support was 45 000 U/g, with 33% activity. The technique is economical, simple to perform, conforms with GRAS regulations and can easily be used in industrial processes. Half-life of the immobilized enzyme was high at room temp. and pH 3-4, stability was improved compared to the free enzyme. The utility of this system is partly limited by inactivation at higher temp. BV

1239

Sears (PS) and Clark (DS). **Comparison of soluble and immobilized trypsin kinetics: implications for peptide synthesis.** *Biotechnology and Bioengineering* 42(1); 1993; 118-124

Trypsin was immobilized on porous glass in both the presence and absence of acetylated soybean trypsin inhibitor (STI) to determine whether immobilization could alter enzyme activity in favour of aminolysis over hydrolysis. Results indicated that immobilization raised the free energy barriers for both amide and ester hydrolysis and lowered the energy barrier for aminolysis. In practice, these effects should lower the amidase activity and increase the aminolysis-hydrolysis ratio, rendering the immobilized enzyme a more efficient catalyst for peptide synthesis. AA

Microorganisms

1240

Crapisi (A), Lante (A), Pasini (G) and Spettoli (P). **Enhanced microbial cell lysis by the use of lysozyme immobilized on different carriers.** *Process Biochemistry* 28(1); 1993; 17-21

Lysozyme (EC 3.2.1.17) is a food grade additive used in the manufacture of certain dairy products (cheeses) to prevent growth of *Clostridium* spp. Immobilization of the enzyme would simplify its removal during processing and also allow its reuse. Immobilization of lysozyme and changes in its lytic properties were investigated. Lysozyme was adsorbed onto chitosan and silica gel, was attached via ionic binding to cross-linked polystyrene divinylbenzene matrix (Deacidite KMP) and by covalent attachment to non-porous glass beads. Immobilization yields decreased on decreasing the amount of enzyme loaded whereas the activation yields (defined as % ratio of immobilized active enzyme to immobilized enzyme, a measure of lytic activity against *Micrococcus luteus*) increased. Chitosan, silica gel, Deacidite KMP and non-porous glass beads showed activation yields of 10, 13.2, 26.67 and 12.77%, respectively. Results indicate that the lysozyme immobilized on all carriers retained satisfactory lytic activity and that thisthis technology might be exploited in the dairy industry to prevent the growth of clostridia in milk, thus overcoming the late-blowing of cheese. BV

Bacteria

1241

Ken (Y-L) and Torres (JA). **Effects of temperature and solute on the minimum water activity for growth and temperature characteristic of selected mesophiles and psychrotrophs.** *Journal of Food Processing and Preservation* 17(4); 1993; 305-318

The temp. effect on the temp. characteristic (energy of activation) and the min. a_w for growth of the psychrotrophs *Pseudomonas fluorescens* and *Brochothrix thermosphacta* and the mesophiles *Salmonella typhimurium*, *Streptococcus faecalis* and *Staphylococcus aureus* was analysed in liquid media. Data showed that the min. a_w of mesophiles is higher than that of psychrotrophs and more sensitive to temp. changes. Min. growth a_w was affected by the a_w-controlling solute. The temp. characteristic of psychrotrophs was significantly lower than that of mesophiles suggesting a strong synergistic effect of low temp. and reduced a_w on the growth of mesophiles. Effect of a_w on the temp. characteristic depended on the a_w-controlling solute. AA

1242

Ferreira (JL), Baumstark (BR), Hamdy (MK) and McCay (SG). **Polymerase chain reaction for detection of type A *Clostridum botulinum* in foods.** *Journal of Food Protection* 56(1); 1993; 18-20

A DNA fragment of type A *Clostridium botulinum* neurotoxin gene was demonstrated in canned food products with polymerase chain reaction (PCR). The fragment, 1340-bp in size, was amplified from green peas, whole kernel corn, green beans, lima beans, black-eyed peas and turnip greens previously inoculated with type A *C. botulinum*. The PCR products were identified by agarose gel electrophoresis and also confirmed by dot blot DNA hybridization with a type A specific gene probe. Some inoculated foods were PCR negative but became PCR positive after subculture and overnight incubation in brain heart infusion broth. No PCR amplification products were obtained from uninoculated foods. The procedure was highly sensitive and detected as few as 100 vegetative cells/ml brain heart infusion broth culture. AA

1243

Ibrahim (SA) and Bezkorovainy (A). **Survival of bifidobacteria in the presence of bile salt.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 351-354

The ability of *Bifidobacterium* spp. to survive in the presence of sodium glycocholate, at concn. ranging from 0 to 3 g l^{-1}, was tested. Bacterial growth was monitored by measuring the optical density for up to 48 h. All the *Bifidobacterium* strains tested showed growth limitation in the presence of sodium glycocholate. However, after a series of propagations in fresh trypticase-peptone-yeast extract medium devoid of bile salt all bacterial strains retained their activity. Results indicated that *Bifidobacterium* spp. are able to survive physiological and higher bile salt levels and that bifidobacteria can be considered for use as dietary adjuncts. BV

1244

Ford (JB), Askins (KJ) and Taylor (KB). **Kinetic models for synthesis by a thermophilic alcohol dehydrogenase.** *Biotechnology and Bioengineering* 42(3); 1993; 367-375

Bacillus amyloliquefaciens

1245

Castro (GR), Mendez (BS) and Sineriz (F). **Amylolytic enzymes produced by *Bacillus amyloliquefaciens* MIR-41 in batch and continuous culture.** *Journal of Chemical Technology and Biotechnology* 56(3); 1993; 289-294

Bacillus amyloliquefaciens MIR-41 was isolated and characterized. The strain showed 3 types of glucanase activities: α-amylase, α-glucosidase and pullulanase (in defined medium with starch as C source). Extracellular activity of α-amylase was approx. 3x higher in continuous culture than in batch. Max. productivity occurred at a dilution rate of 0.16 h^{-1}. α-Glucosidase was expressed as a cell-bound enzyme in batch culture, but in continuous culture was mostly extracellular. Pullulanase was always cell-bound. Expression of the enzyme was dependent upon the system and the dilution rate used. No cell lysis was detected in the chemostat as compared with batch cultures. AA

Bacillus subtilis

1246

Klein (C), Kaletta (C) and Entian (KD). **Biosynthesis of the lantibiotic subtilin is regulated by a histidine kinase/response regulator system.** *Applied and Environmental Microbiology* 59(1); 1993; 296-303

Subtilin is a lanthionine-containing peptide antibiotic (lantibiotic) which is produced by *Bacillus subtilis* ATCC 6633. Upstream from the structural gene of subtilin, spaS, 3 genes (spaB, spaT and spaC) which are involved in the biosynthesis of subtilin have been identified. By using a hybridization probe specific for these genes, the DNA region downstream from spaS was isolated. Further subcloning revealed a 5.2-kb KpnI-HindIII fragment on which 2 open reading frames (ORF), spaR and spaK, were identified approx. 3 kb downstream from spaS. The spaR gene encodes an ORF of 220 amino acids with a predicted molecular mass of 25.6 kDa. SpaR shows 35% similarity to positive regulatory factors OmpR and PhoB. The spaK gene encodes an ORF of 387 amino acids with a predicted molecular mass of 44.6 kDa and was highly similar to histidine kinases previously described (PhoM, PhoR and NtrB). Hydrophobicity blots suggested 2 membrane-spanning regions. Thus, spaR and spaK belong to a recently identified family of environmentally responsible regulators. Results indicated a regulatory function of spaR and spaK in subtilin biosynthesis. Batch culture experiments confirmed the regulation of subtilin biosynthesis starting in the mid-logarithmic growth phase and reaching its maximum in the early stationary growth phase. Gene deletions within spaR and spaK yielded subtilin-negative mutants, which confirmed that subtilin biosynthesis is under the control of a 2-component regulatory stytem. A fusion of the spaR ORF with the constitutively expressed spo promoter was used to complement the spaR mutant to exclude any polar effects of spaR on spaK. AA

Clostridium sporogenes

1247

Shamsuzzaman (K) and Lucht (L). **Resistance of *Clostridium sporogenes* spores to radiation and heat in various nonaqueous suspension media.** *Journal of Food Protection* 56(1); 1993; 10-12

The influence of suspension in a phosphate buffer and various lipid media on heat and radiation resistance of *Clostridium sporogenes* PA3679 was examined. Lyophilized spores were suspended in vegetable oils, animal fats, synthetic triglycerides, glycerol or phosphate buffer, and their radiation and heat D_{10} values (dose or time required for 90% inactivation) were determined. Radiation D_{10} values in the lipids were much higher than in phosphate buffer. Radiation D_{10} values in triolein and tributyrin were similiar, suggesting chain length may not be a significant factor in radiation resistance. The heat D_{10} value of the spores in a phosphate buffer at 95 plus or minus 1°C was close to that in beef fat and was much higher than in other lipid media tested. Heat D_{10} value in triolein was > twice that in tributyrin, suggesting fatty acid chain length is an important factor in heat resistance of the spores in triglycerides. The effects of various nonaqueous suspension media on radiation-induced thermosensitivity of spores were also determined. A comparison of heat D_{10} values of spores with and without prior irradiation in various media showed that irradiation at 5.0 kGy greatly increased their heat sensitivity. AA

Corynebacterium glutamicum

1248

Broeer (S), Eggeling (L) and Kraemer (R). **Strains of *Corynebacterium glutamicum* with different lysine productivities may have different lysine excretion systems.** *Applied and Environmental Microbiology* 59(1); 1993; 316-321

The lysine excretion systems of 3 different lysine-producing strains of *Corynebacterium glutamicum* were characterized in intact cells. 2 strains (DG 52-5 and MH 20-22B) are lysine producers of different efficiency. They were bred by classical mutagenesis and have a feedback-resistant aspartate kinase. The third strain (KK 25) was constructed from the wild type by introducing the feedback-resistant aspartate kinase gene of strain MH 20-22B into its genome. The 3 strains were shown to possess different excretion systems. Export in strain KK 25 is much slower than in the 2 mutants. Differences between the 2 lysine-producing strains are more stable. K_m V_{max} are similar, but pH dependence and membrane potential dependence reveal differences in the intrinsic properties of the carrier system. AA

Lactobacillus acidophilus

1249

King (VAE) and Su (JT). **Dehydration of *Lactobacillus acidophilus*.** *Process Biochemistry* 28(1); 1993; 47-52

Freeze-drying (FD), vacuum-drying (VD) and controlled low-temp. vacuum dehydration were used to dehydrate *Lactobacillus acidophilus*. FD gave the highest survival ratio, followed by low-temp. vacuum dehydration. The latter process required shorter drying times but produced products with case hardening and shrinkage and poor rehydration rates. The VD treatment was considered to be unsuitable for culture preservation use. Addition of various protectants did not improve storage of dehydrated products. Storage at low temp. (5 and -20°C) was better than room temp. storage. BV

Lactobacillus bulgaricus

1250

Venkatesh (KV), Okos (MR) and Wankat (PC). **Kinetic model of growth and lactic acid production from lactose by *Lactobacillus bulgaricus*.** *Process Biochemistry* 28(4); 1993; 231-241

Batch and continuous fermentation kinetics of *Lactobacillus bulgaricus* were examined. The batch kinetic model included the effect of pH, product (lactic acid) and substrate (lactose). The effect of pH on the enzyme β-galactosidase was reflected in the value of μmax, Monod's growth constant. Empirical expressions to estimate model parameters based on pH were established. These were used to estimate cell mass and lactic acid concn. for fermentations without pH control. At high pH, lactic acid was mostly formed by growth associated mechanisms and at low pH it was due to cell maintenance. The relationship between ATP concn. and cell mass in a batch fermentation could be approximated by a Leudeking-Piret like relationship. Continuous fermentations were studied by varying pH and initial substrate conditions. Max. productivity of 6.2 g/l per h was obtained at pH 5.6 for the CSTR (continuous stirred tank reactor) system, which was 3x the productivity obtained for a batch system at the same pH. The CSTR system had a high productivity over a very small range of retention times. 3 stages were sufficient to completely utilize the lactose, but at the cost of decreasing productivity to 4.8 g/l per h. AA

Lactobacillus plantarum

1251

Vujcic (M) and Topisirovic (L). **Molecular analysis of the rolling-circle replicating plasmid pA1 of *Lactobacillus plantarum* A112.** *Applied and Environmental Microbiology* 59(1); 1993; 274-280

Lactobacillus plantarum A112 has 4 different plasmids. Plus-origin-specific probes were used to determine that the smallest, cryptic plasmid, pA1 (2820 bp), showed homology to the pE194 plasmid family. This subclass of plasmids uses the rolling-circle mode of replication. Analysis of plasmid pA1 demonstrated that it generates single-stranded DNA intermediates, and sequence analysis revealed that it contains 3 putative open reading frames (ORF): ORF1, ORF2 and ORF3, which could encode proteins designated RepA (47 amino acids [aa]) and RepB (196 aa) and a protein of 103 aa, respectively. 2 of these proteins, RepA (5.6 kDa) and RepB (26 kDa), were identified in *in vitro* transcription translation assays. The RepA protein contained a characteristic α-helix-turn-α-helix motif typical of DNA-binding proteins that act as DNA-binding repressors. The RepB protein showed a significant similarity with replication initiation proteins of the pE194 family of plasmids that use the rolling-circle mode of replication. Plasmid pA1 was able to replicate in *Escherichia coli* and *Lact. lactis* subsp. *lactis* as well as in other *Lact. plantarum* strains. AA

Lactococcus lactis

1252

de Vos (WM), Mulders (JWM), Siezen (RJ), Hugenholtz (J) and Kuipers (OP). **Properties of nisin Z and distribution of its gene, nisZ, in *Lactococcus lactis.*** *Applied and Environmental Microbiology* 59(1); 1993; 213-218

Two natural variants of the lantibiotic nisin that are produced by *Lact. lactis* are known. They have a similar structure but differ in a single amino acid residue at position 27: histidine in nisin A and asparagine in nisin Z. The 2 variants were purified to apparent homogeneity, and their biological activities compared. Identical MIC [min. inhibitory concn.] of nisin A and nisin Z were found with all tested indicator strains of 6 different spp. of Gram-positive bacteria. However, at concn. above the MIC, with nisin Z the inhibition zones obtained in agar diffusion assays were invariably larger than those obtained with nisin A. This was observed with all tested indicator strains. Results suggest that nisin Z has better diffusion properties than nisin A in agar. The distribution of the nisin variants in various lactococcal strains was determined by amplification of the nisin structural gene by PCR followed by direct sequencing of the amplification product. It was established that the nisZ gene for nisin Z production is widely distributed, having been found in 14 of the 26 *Lact. lactis* strains analysed. AA

1253

Moineau (S), Durmaz (E), Pandian (S) and Klaenhammer (TR). **Differentiation of two abortive mechanisms by using monoclonal antibodies directed toward lactococcal bacteriophage capsid proteins.** *Applied and Environmental Microbiology* 59(1); 1993; 208-212

Monoclonal antibodies were used to monitor accumulation of the major capsid protein of the lactococcal small isometric bacteriophage u136 (P335 species) over the course of a one-step growth curve [of *Lactococcus lactis*]. A sandwich

ELISA was then used to distinguish 2 abortive phage resistance mechanisms, Hsp and Prf. Capsid protein production of u136 was almost totally inhibited by the Hsp-induced abortive mechanism, supporting previous data that this mechanism blocks phage DNA replication. Prf-induced abortive infection only partially (50%) inhibited capsid protein production, suggesting that this mechanism targets some other point, perhaps within transcription or translation processes. Results confirmed that Hsp and Prf act at different targets in the phage lytic cycle. Use of the monoclonal antibodies also demonstrated that the production of the major capsid protein is a nonlimiting step in the lytic cycle of lactococcal phage u136. AA

1254

Israelsen (H) and Hansen (EB). **Insertion of transposon Tn917 derivatives into the *Lactococcus lactis* subsp. *lactis* chromosome.** *Applied and Environmental Microbiology* 59(1); 1993; 21-26

Two transposition vectors, pTV32 and pLTV1, containing transposon Tn917 derivatives TV32 and LTV1, respectively, were introduced into *Lactococcus lactis* subsp. *lactis* MG1614. pTV32 and pLTV1 replicated and TV32 and LTV1 transposed in this strain. A protocol for production of a collection of Tn917 insertions in *Lact. lactis* subsp. *lactis* was developed. Physical locations of TV32 on the chromosomal SmaI fragments of 62 independent transpositions were established by pulsed-field gel electrophoresis. These transpositions could be divided into at least 38 different groups that exhibited no Tn917-dominating hot spots on the *Lact. lactis* subsp. *lactis* chromosome. 10 of the 62 transpositions resulted in strains that expressed β-galactosidase. This indicates that there was fusion of the promoterless lacZ of the Tn917 derivatives to a chromosomal promoter. Thus, the Tn917-derived transposons should be powerful genetic tools for studying *Lact. lactis* subsp. *lactis*. AA

1255

Hyndman (CL), Groboillot (AF), Poncelet (D), Champagne (CP) and Neufeld (RJ). **Microencapsulation of *Lactococcus lactis* within cross-linked gelatin membranes.** *Journal of Chemical Technology and Biotechnology* 56(3); 1993; 259-263

Lactococcus lactis subsp. *cremoris* were encapsulated within gelatin membranes cross-linked with toluene-2,4-diisocyanate at an oil/water interface. Reagent toxicity was avoided by use of vegetable or silicone oil as a dispersant, and by minimizing cell exposure to the water insoluble cross-linking agent during membrane formulation. Growth of cells within the gelatin microcapsules was observed during fermentation and acidification activity of the encapsulated cells increased with subsequent reuse. A microencapsulated cell density of 10^9 cfu cm^{-3} resulted in acidification of milk to pH 5.5 within 2.8 h, similar to that achieved in free cell fermentations. AA

Listeria

1256

Czajka (J), Bsat (N), Piani (M), Russ (W), Sultana (K), Wiedmann (M), Whitaker (R), Batt (CA). **Differentiation of *Listeria monocytogenes* and *Listeria innocua* by 16S rRNA genes and intraspecies discrimination of *Listeria monocytogenes* strains by random amplified polymorphic DNA poly.morphisms.** *Applied and Environmental Microbiology* 59(1); 1993; 304-308

Differences in the 16S rRNA genes (16S rDNA) which can be used to discriminate *Listeria monocytogenes* from *L. innocua* were detected. The 16S rDNA were amplified by PCR with a set of oligonucleotide primers which flank a 1.5-kb fragment. Sequence differences were observed in the V2 region of 16S rDNA both between *L. monocytogenes* Scott A and *L. innocua* and between different *L. monocytogenes* serotypes. Although *L. monocytogenes* SLCC2371 had the same V2 region sequence as *L. innocua*, the 2 spp. were different within the V9 region at nucleotides 1259 and 1292. Intraspecies discrimination of *L. monocytogenes* strains was achieved by using the patterns generated by random amplified polymorphic DNA primers. Although some distinction can be made within the *L. monocytogenes* sp. by their 16S rDNA sequence, a far greater discrimination within sp. could be made by generating random amplified polymorphic DNA patterns from chromosomal DNA. By using a number of 10-bp primers, unique patterns for each isolate which in all cases examined differentiate between various *L. monocytogenes* serotypes, even though they may have the same 16S rRNA sequences, could be generated. AA

Listeria monocytogenes

1257

Datta (AR), Moore (MA), Wentz (BA) and Lane (J). **Identification of enumeration of *Listeria monocytogenes* by nonradioactive DNA probe colony hybridization.** *Applied and Environmental Microbiology* 59(1); 1993; 144-149

A plasmid containing the cloned listeriolysin gene of *Listeria monocytogenes* was used as a gene probe to identify *Listeria* strains by DNA colony hybridization. The probe DNA was labelled with horseradish peroxidase in the presence of glutaraldehyde. After hybridization and wash procedures, hybrid molecules were detected by luminescence, which resulted from oxidation of luminol by a horseradish peroxidase-hydrogen peroxide-coupled reaction. Of 150 Listeria strains and 16 non-Listeria strains examined, the probe hybridized only with L. monocytogenes. The technique was used to enumerate L. monocytogenes in artificially contaminated foods [cheese, lettuce, shrimp]. AA

1258

Hefnawy (YA) and Marth (EH). **Survival and growth of *Listeria monocytogenes* in broth supplemented with sodium chloride and held at 4 and 13 degree.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 388-392

Pseudomonas fluorescens

1259

Rodriguez (F-C), Berasategui (J) and Villafafila (A). **Role of bivalent cations on the catalytic properties of an extracellular lipase of *Pseudomonas fluorescens*.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 422-425

An extracellular lipase (EC 3.1.1.3) from *Pseudomonas fluorescens* was investigated and its kinetic constants with 4-methylumbelliferyl oleate was determined. Effects of Ca^{2+}, Mg^{2+} and Hg^{2+} ions and EDTA on lipolytic activity were also determined. Ca^{2+} and Mg^{2+} ions were found to be activators of lipase activity; activation constants of 1.14×10^{-4} and 5.83×10^{-5} mol/l, respectively, were derived. Hg^{2+} inhibited the extracellular lipase activity; an inactivation constant of 1.98×10^{-7} mol/l was determined. BV

Streptococcus thermophilus

1260

Shahbal (S), Hemme (D) and Renault (P). **Characterization of a cell envelope-associated proteinase activity from *Streptococcus thermophilus* H-strains.** *Applied and Environmental Microbiology* 59(1); 1993; 177-182

Production and biochemical properties of cell envelope-associated proteinases from 2 strains of *Streptococcus thermophilus* (CNRZ 385 and CNRZ 703) were compared. No significant difference in proteinase activity was found for strain CNRZ 385 when cells were grown in skim milk medium and M17 broth. Strain CNRZ 703 exhibited a 3-fold-higher proteinase activity when cells were grown in low-heat skim milk medium than when grown in M17 broth. 41% of total activity of CNRZ 385 was localized on the cell wall. Optimum pH for enzymic activity at 37°C was approx. 7.0. Serine proteinase inhibitors, such as phenylmethylsulphonyl fluoride and diisopropylfuorophosphate, inhibited enzyme activity in both strains. The divalent cations Ca^{2+}, Mg^{2+}, and Mn^{2+} were activators, while Zn^{-2+} and Cu^{2+} were inhibitors. β-Casein was hydrolysed more rapidly than α_{s1}-casein. Results of DNA hybridization and immunoblot studies suggested that the *Strep. thermophilus* cell wall proteinase not closely related. AA

Fungi

1261

Rane (KD) and Hoover (DG). **An evaluation of alkali and acid treatments for chitosan extraction from fungi.** *Process Biochemistry* 28(2); 1993; 115-118

Chitosan extractions of mycelia from *Absidia coerulea* ATCC 14076 were examined using hot alkaline and acid treatments. Alkaline treatments were carried out at 95 and 121°C using sodium hydroxide with varying extraction times. Acid treatments were carried out at 95°C using hydrochloric, formic and acetic acids with various extraction times. The highest yields of chitosan were obtained with alkaline extraction at 121°C for 30 min and hydrochloric acid extraction at 95°C for 12 h. Effects on the degree of acetylation and viscosity of the chitosan of various treatments were also examined. AA

1262

Paul (GC), Kent (CA) and Thomas (CR). **Viability testing and characterization of germination of fungal spores by automatic image analysis.** *Biotechnology and Bioengineering* 42(1); 1993; 11-23

1263

Thompson (DP), Metevia (L) and Vessel (T). **Influence of pH alone and in combination with phenolic antioxidants on growth and germination of mycotoxigenic species of *Fusarium* and *Penicillium*.** *Journal of Food Protection* 56(2); 1993; 134-138

The effect of pH alone and in combination with 2 phenolic antioxidants on mycelial growth and conidial germination of mycotoxigenic fungi was examined. Mycotoxigenic fungi studied included 7 members each of *Fusarium* and *Penicillium* genera. The study was carried out at pH 4, 6, 8 and 10 alone and in the presence of 100 and 200 µg/ml BHA and propyl paraben, respectively. All test fungi examined were able to grow at pH 4, 6, 8 and 10 on potato dextrose agar. The majority of *Fusarium* spp., except *F. graminearum*, were tolerant of acid and alkaline pH. 2 of the *Penicillium* spp. were rapid growers and were tolerant of acid and alkaline pH. Slower growing *Penicillium* spp. varied in their tolerance to acid and alkaline pH. Conidial germination was partially inhibited in all *Fusarium* and *Penicillium* spp. in the presence of 100 µg/ml BHA at all pH levels. In the presence of 200 µg/ml BHA, there was complete inhibition of conidial germination for 4 of the *Fusarium* spp. at all pH levels. Propyl paraben, at the 4 pH levels completely inhibited conidial germination in *Fusarium* spp. and all but one *Penicillium* spp. at 200 µg/ml. Reduction in colony diam. for the majority of *Fusarium* and *Penicillium* spp., at all pH levels was observed at 100 and 200 µg/ml BHA. At 200 µg/ml propyl paraben, mycelial growth was completely inhibited for the majority of *Fusarium* and *Penicillium* spp. at the 4 pH levels. AA

Aspergillus flavus

1264

Payne (GA), Nystrom (GJ), Bhatnagar (D), Cleveland (TE) and Woloshuk (CP). **Cloning of the afl-2 gene involved in aflatoxin biosynthesis from *Aspergillus flavus*.** *Applied and Environmental Microbiology* 59(1); 1993; 156-162

Aflatoxins are extremely potent carcinogens produced by *Asp. flavus* and *Asp. parasiticus*. Cloning of genes in the aflatoxin pathway provides a specific approach to understanding regulation of aflatoxin biosynthesis and, subsequently, to control the aflatoxin contamination of food and feed. Isolation is described of a gene involved in aflatoxin biosynthesis by complementation of an aflatoxin nonproducing mutant with a wild-type genomic cosmid library of *Asp. flavus*. Strain 650-33, blocked in aflatoxin biosynthesis at the afl-2 allele, was complemented by a 32-kb cosmid clone (B9), resulting in production of aflatoxin. The onset and profile of aflatoxin accumulation was similar for the transformed strain and the wild-type strain (NRRL 3357) of the fungus, indicating that the integrated gene was under the same control as in wild-type strains. Complementation analyses with DNA fragments from B9 indicated that the gene resides within a 2.2-kb fragment. Because this gene complements the mutated afl-2 allele, it was designated afl-2. Genetic evidence obtained from a double mutant showed that afl-2 is involved in aflatoxin biosynthesis before the formation of norsolorinic acid, the first stable intermediate identified in the pathway. Metabolite feeding studies with mutant, transformed, and wild-type cultures and enzymic activity measurements in cell extracts of these cultures suggested that afl-2 regulates gene expression or the activity of other aflatoxin pathway enzymes. This is the first reported isolation of a gene for aflatoxin biosynthesis in *Asp. flavus*. AA

1265

Lekha (PK), Ramakrishna (M) and Lonsane (BK). **Strategies for the isolation of potent fungal cultures capable of producing tannin acyl hydrolase in higher titres.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 5-10

Production of tannase (tannin acyl hydrolase) by 10 fungi isolated directly from soil and by 33 strains from culture collections was studied. Max. production in solid state fermentation was poor (< 400 units/g dry mould bran) and a renewed isolation programme using various isolation sources and strategies was undertaken. 76 fungal isolates were obtained; the 3 highest producers of tannase were obtained by a baiting method (involving incubation of moist soil with 1% tannic acid for 10 days and subsequent enrichment in liquid medium containing 2% tannic acid as sole C source) and were able to produce 980-1100 units/g dry mould bran. The next highest tannase producer was obtained from moist myrobalan nut powder. *Aspergillus niger* PKL 104, the highest producer of tannase obtained by the baiting method, required tannic acid as inducer to produce the enzyme. Biosynthesis of the enzyme increased with the increase in tannic acid concn. up to 4% (w/w) while the enzyme was not produced in the absence of the inducer. Tannic acid was rapidly consumed by the culture and enzyme production was found to be growth associated. AA

Aspergillus niger

1266

Sandhya Xavier, Ramakrishna (M), Lonsane (BK), Karanth (NG) and Krishnaiah (MM). **Suppression of transglucosidase coproduction by moisture content of the medium in amyloglucosidase production by *Aspergillus niger* in solid state fermentation.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 25-29

Transglucosidase was not coproduced by *Asp. niger* CFTRI 1105 in wheat bran media with less than 80% initial moisture content in a solid state fermentation system for production of amyloglucosidase. It was coproduced in media with 80-98% initial moisture content and also in 3 different submerged fermentation media under both static and agitated conditions. Coproduction of transglucosidase increased by 3.3 times when initial moisture content was increased from 80 to 90%. Suppression of transglucosidase coproduction by moisture content of the medium is being reported for the first time and is of economical and practical significance. AA

1267

Srinivas (MRS), Sriram (P) and Lonsane (BK). **Growth kinetics, α-galactosidase biosynthesis, and concomitant production of invertase by *Aspergillus niger* NCIM 839 in solid state fermentation system.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 41-46

Production of α-galactosidase by *Aspergillus niger* NCIM 839 increased by 32.62% with the inclusion of 4% guar flour and 1% lactose in the basal wheat bran medium. Incorporation of guar flour, lactose or glucose did not improve enzyme titres and enrichment with ammonium sulphate resulted in irregular trends. Invertase was also concomitantly produced with alpha-galactosidase. Production of both enzymes appeared to be mostly cell growth associated as only 19.5% of total α-galactosidase was formed in the early stationary phase. Temp. and pH optima of acetone-precipitated α-galactosidase were 60°C and 4.5, respectively and were independent of each other. The enzyme exhibited max. stability between pH 5.2 and 6.2, but was found to be heat labile. Properties of α-galactosidase produced by *Asp. niger* NCIM 839 appear to be suited for application in soy processing, but not in the beet sugar industry due to the coproduction of invertase. AA

Mucor miehei

1268

Oliveira (AC) and Cabral (JMS). **Kinetics studies of *Mucor miehei* lipase in phosphatidylcholine microemulsions.**

Journal of Chemical Technology and Biotechnology 56(3); 1993; 247-252

Ethanol-oleic acid esterification by a free and microencapsulated lipase from Mucor miehei, using dodecane as solvent and phosphatidylcholine as surfactant, was studied. The initial esterification rate was influenced by the water content in the biphasic system. Kinetic studies with free and microencapsulated enzyme showed that microencapsulation increased kinetic parameters (V_{max} and K_m), probably due to an increased interfacial area. The reaction rate was also affected by the shaking rate, temp. and pH. Optimal temp. and pH were, respectively, 40°C and 4.5 using free enzyme, and 50°C and 6 using microencapsulated enzyme. AA

Mucor rouxii

1269

Kafetzopoulos (D), Martinou (A), Tsigos (I) and Bouriotis (V). **Isolation and characterisation of chitin deacetylase from *Mucor rouxii*.** *Journal of Chemical Technology and Biotechnology* 56(4); 1993; 417-418

This paper was presented at the International Conference on the Enzymatic Synthesis and Modification of Carbohydrates held on 1-3 July, 1992 in Warwick, UK. Chitin deacetylase from *M. rouxii* was purified and characterized. The apparent mol. wt. of the enzyme was 75 000 by SDS-PAGE and gel filtration. The enzyme was an acidic high mannose glycoprotein with pH and temp. optima of 4.5 and 50°C, respectively. An immunoaffinity purification technique for the enzyme is described. BV

Mushrooms

1270

Nussinovitch (A) and Kampf (N). **Shelf-life extension and conserved texture of alginate-coated mushrooms (*Agaricus bisporus*).** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 469-475

Mushrooms were coated with different concn. of alginate film (1 or 2%); the coating process involved chemically crosslinking the alginate with Ca. After coating, mushrooms were stored at room temp. or 4°C. 1% coated mushrooms stored at room temp. and 1 and 2% coated cold stored mushrooms were found to have higher L (lightness-darkness) values, indicating a lighter colour and a better appearance than untreated controls. The rate of evaporation for coated mushrooms decreased on storage at room temp., thereby preventing changes in texture. Coated mushroom strength, as tested using a Universal Tesing Machine, and integrity were maintained for greater periods than those for uncoated controls. Appearance of coated mushrooms was also improved by the glossiness of the coating. BV

1271

Madenjian (JJ), Eifert (JD) and Lawrence (JF). **Ciidae: newly recognized beetle pests of commercial dried mushrooms.** *Journal of Stored Products Research* 29(1); 1993; 45-48

One hundred and sixty-seven samples representing 8 species of packaged, dried mushrooms were collected from 29 markets in the central Los Angeles area. Packages were visually examined for obvious insect infestations. Ciid material, representing 3 species, was found in 6 samples. 1 of these samples which had been stored for about 8 months after collection from the market yielded large numbers of live ciid adults and larvae from the one package. This finding represents direct evidence of post-harvest development and thereby establishes stored product pest status for the family. No previous literature exists on ciids as pests of commercial, stored, dried mushrooms. AA

Neosartorya fischeri

1272

Hang (YD) and Woodams (EE). **Characterization of glucoamylase from *Neosartorya fischeri*.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 483-484

The heat resistant fungi *Neosartorya fischeri* M-1 produced large amounts of thermostable extracellular glucoamylase after 96 h of growth in a corn starch medium. The enzyme was most active at 55-60°C, pH 4.0-4.4. K_m V_{max} values for the enzyme using 1% amylopectin as substrate were 2.4 g/l and 12 mg glucose/(l/min), respectively. Mol. wt. of the enzyme was estimated by gel filtration to be approx. 34 kDa. BV

Yeasts

1273

Gupta (PK), Garg (SK) and Mital (BK). **Incidence of yeasts from different sources.** *Beverage and Food World* 21(3); 1994; 20, 21, 23

Morphological and biochemical study was conducted to determine the incidence of different types of yeast sp. encountered in flowers, lemon, apple, curd and bread. 15 yeast cultures were isolated and identified as *Trichosporon eriense*, *T. melibiosaceum*, *Candida versatilis*, *C. intermedia*, *C. maltosa*, *C. buirensis*, *C. silvicultrix*, *C. oleophila* and *Rhodotorula fujisensis*. *Candida* sp. were the most frequently isolated yeasts as compared to the sp. of *Trichosporon* and *Rhodotorula*. SRA

1274

Ming-Pan (T) and Chi-Ku (CO). **Production of flavor by a mutant of yeast.** *Journal of Food Processing and Preservation* 17(3); 1993; 213-225

Strain CCU-N_{16}-18143 was derived from a wild strain CCU-16 after treatment with N-methyl-N'-nitro-N-nitrosoguanidine (NTG) 3x. This mutant was identified as *Saccharomyces* sp. Optimal culture medium for production of flavour compounds was 1 l of medium containing 100 g glucose, 12 g ammonium nitrate, 3 g yeast extract, 1 g magnesium sulphate, 1 g ammonium sulphate, 2 g potassium dihydrogen phosphate, pH 3.5. Optimal culture conditions were: temp. 30°C; agitation 150 rpm of 50 ml medium in 500-ml Hinton flask; incubation time 96 h. The volatile flavour compounds in the culture medium were analysed by capillary GC and capillary GC-MS. It was found that more volatile compounds were produced by the mutant strain than the wild strain. The content of isoamyl alcohol in the medium increased from 7.76 to 61.64%, whereas ethyl alcohol decreased from 85.25 to 5.77%. AA

Saccharomyces cerevisiae

1275

Giuseppin (MLF), Almkerk (JW), Heistek (JC) and Verrips (CT). **Comparative study on the production of guar α-galactosidase by *Saccharomyces cerevisiae* SU50B and *Hansenula polymorpha* 8/2 in continuous cultures.** *Applied and Environmental Microbiology* 59(1); 1993; 52-59

Saccharomyces cerevisiae SU50B and *Hansenula polymorpha* 8/2, both carrying a recombinant multicopy integrated guar α-galactosidase gene, were cultivated in continuous cultures, using various mixtures of C sources and cultivation conditions. Both *Sacch. cerevisiae* SU50B and *H. polymorpha* 8/2 were stable and produced high levels of extracellular α-galactosidase in continuous cultures for greater than 500 h. For expression, the strong inducible promoter systems GAL7 and methanol oxidase, respectively, were used. Induction of α-galactosidase synthesis by galactose in SU50B was limited by low galactose uptake. At high dilution rates, glucose repression was substantial, and a max. expression level of 28.6 mg of extracellular α-galactosidase g biomass^{-1} (dry weight) was obtained. In *H. polymorpha*, induction of α-galactosidase synthesis, in addition to methanol oxidase synthesis using formaldehyde, was very effective up to 42 mg of extracellular α-galactosidase g biomass^{-1} (dry wt.). Productivities of *S. cerevisiae* SU50B and *H. polymorpha*, 3.25 and 5.5 mg of α-galactosidase g biomass^{-1} l^{-1} h^{-1}, respectively, rank among the highest reported in the literature. Enzyme production and secretion in *H. polymorpha* was more complex. A 2-peaked optimum in enzyme production occurred. No clear explanation of this phenomenon can be given. AA

1276

Longo (E) and Vezinhet (F). **Chromosomal rearrangements during vegetative growth of a wild strain of *Saccharomyces cerevisiae*.**

Applied and Environmental Microbiology 59(1); 1993; 322-326

Electrophoretic karyotypes of 2 strains of *Sacch. cerevisiae*, a haploid laboratory strain and a wild strain known to be at least diploid, were checked during vegetative growth. The karyotype of the haploid strain was very stable; however, the diploid strain underwent frequent modifications. In most cases the number of bands was reduced, but occasionally 1 band splitting into 2 was observed. In 1 case, chromosomal rearrangements took place between differently sized copies of chromosomes I and VI. It was concluded that the chromosome length polymorphism observed among wild strains of *Sacch. cerevisiae* could be explained partly by chromosomal structure reorganization occurring during mitosis. AA

1277

Stanley (GA) and Pamment (NB). **Transport and intracellular accumulation of acetaldehyde in *Saccharomyces cerevisiae*.** *Biotechnology and Bioengineering* 42(1); 1993; 24-29

BIOTECHNOLOGY

1278

Gowthaman (MK), Ghildyal (NP), Raghava Rao (KSMS) and Karanth (NG). **Interaction of transport resistances with biochemical reaction in packed bed solid state fermenters: the effect of gaseous concentration gradients.** *Journal of Chemical Technology and Biotechnology* 56(3); 1993; 233-239

Mass transfer plays an important role in solid state fermentation (SSF) systems. Earlier work on SSF in tray bioreactors indicated that steep gaseous concentration gradients developed within the substrate bed, owing to mass transfer resistances, which may adversely affect bioreactor performance. These gradients were effectively eliminated using a packed bed column bioreactor with forced aeration. Gaseous concn. (O_2 and CO_2) and enzyme [amyloglucosidase] activities were measured at various bed heights for various air flow rates during the course of [*Aspergillus niger*] fermentation. Results indicated that concn. gradients were decreased effectively by increasing air flow rate. For example, the actual O_2 and CO_2 concn. gradient reduced from 0.07 and 0.023% (v/v) cm^{-1} to 0.007 and 0.0032% (v/v) cm^{-1}, respectively, when air flow rate was increased from 5 to 25 dm^3 min^{-1}. This resulted in an overall improvement in performance of the bioreactor in terms of enzyme production. AA

1279

Wiseman (A). **Designer enzyme and cell applications in industry and in environmental monitoring.** *Journal of Chemical Technology and Biotechnology* 56(1); 1993; 3-13

The application of enzymes in biotechnology is reviewed. Aspects considered include: industrial uses of enzymes and cells; enzymes in the detergents industry; enzymes in the brewing industry; enzymes in other food industries, including the sugar industries; environmental monitoring using immobilized enzymes and cells; environmental aromatic chemicals and their detection; and concluding comments. 49 references. BV

1280

Ajongwen (NJ) and Barker (PE). **Scale-up studies of non-aerated fed-batch fermentation of dextransucrase and the industrial synthesis of dextran using the enzymatic route.** *Journal of Chemical Technology and Biotechnology* 56(1); 1993; 113-118

High activities of dextransucrase [EC 2.4.1.5] were produced using slowly agitated non-aerated fed-batch fermentation of *Leuconostoc mesenteroides* B-512(F). Activities greater than 24.0 U·cm^{-3} were obtained in a 16 dm^3 laboratory fermenter using a 6 dm^3 initial work vol. Yeast extract type was an important influencing factor on enzyme yield. The presence of CO_2 in the medium favoured high enzyme production. Agitation rates did not have significant effects on either cell growth or enzyme production. Silicone antifoam affected enzyme production but not cell growth. Scale-up to 1000 dm^3 resulted in enzyme broths containing up to 21.0 U cm^{-3} being produced. 2 batches of the large scale produced enzyme were used to synthesize dextran at a 50 000 dm^3 industrial scale. Dextran yields were up to 95.5% of conventional industrial yields and were achieved in much shorter reaction time intervals. AA

1281

Demirici (A), Pometto (ALIII) and Johnson (KE). **Lactic acid production in a mixed-culture biofilm reactor.** *Applied and Environmental Microbiology* 59(1); 1993; 203-207

Novel solid supports, consisting of polypropylene (pp) blended with various agricultural materials (pp composite), were evaluated as supports for pure- and mixed-culture continuous lactic acid fermentations in biofilm reactors. *Streptomyces viridosporus* T7A (ATCC 39115) was used to form a biofilm, and *Lactobacillus casei* subsp. *rhamnosus* (ATCC 11443) was used for lactic acid production. For mixed-culture fermentations, a 15-day continuous fermentation of *Strep. viridosporus* was performed initially to establish the biofilm. The culture medium was then inoculated with *L. casei* subsp. *rhamnosus*. For pure-culture fermentation, *L. casei* subsp. rhamnosus was inoculated directly into the reactors containing sterile pp composite chips. The biofilm reactors containing various pp composite chips were compared with a biofilm reactor containing pure polypropylene chips and with a reactor containing a suspension culture. Continuous fermentation was started, and each flow rate (0.06-1.92 ml/min) was held constant for 24 h; steady state was achieved after 10 h. Lactic acid production was determined throughout the 24 h period by HPLC. Production rates 2-5x faster than those of the suspension culture (control) were observed for the pure- and mixed-culture bioreactors. Both lactic acid production rates and lactic acid concn. in the culture medium were consistently higher in mixed-culture than in pure-culture fermentations. Biofilm formation on chips was detected at harvest by chip clumping and Gram staining. AA

1282

Chartier (CMP), Nardi (M), Chopin (MC), Chopin (A) and Gripon (JC). **Cloning and sequencing of pepC, a cysteine aminopeptidase gene from *Lactococcus lactis* subsp. *cremoris* AM2.** *Applied and Environmental Microbiology* 59(1); 1993; 330-333

A gene coding for an aminopeptidase (PepC) from *Lactococcus lactis* subsp. *cremoris* AM2 was cloned by complementation of an Escherichia coli mutant lacking aminopeptidase activity. The nucleotide sequence was determined. A portion of the predicted amino acid sequence of PepC (436 amino acids) showed strong homology to the active site of cysteine proteases. No signal sequence was found, indicating an intracellular location of the enzyme. AA

1283

Stamatis (H), Xenakis (A), Provelegiou (M) and Kolisis (FN). **Esterification reactions catalyzed by lipases in microemulsions: the role of enzyme localization in relation to its selectivity.** *Biotechnology and Bioengineering* 42(1); 1993; 103-110

Activity of lipases from Rhizopus delemar, R. arrhizus and Penicillium simplicissimum entrapped in microemulsions formulated by bis-(2-ethylhexyl)sulphosuccinate sodium salt (AOT) in isooctane was studied in esterification reactions of various aliphatic alcohols with fatty acids. The effect of the nature of the fatty acids (chain length) and of the alcohols (primary, secondary, tertiary; chain length; cyclic structures) on lipase activities was investigated in relation to the reverse micellar structure. Lipases showed a selectivity regarding the structure of substrates used when immobilized in AOT/isooctane microemulsion system. P. simplicissimum lipase showed higher reaction rates for the esterification of long chain alcohols and secondary alcohols. Primary alcohols had a low reaction rate and tertiary a very slow rate of esterification. Long chain fatty acids were more effectively catalysed than the shorter ones. R. delemar and *R. arrhizus* lipases showed a preference for short chain primary alcohols, while secondary alcohols had a low rate of esterification and tertiary alcohols could not be converted. Medium chain length fatty acids were more efficiently catalysed than long ones. The observed lipase selectivity was related to the localization of the enzyme molecule within the micellar microstructure due to the hydrophobic/hydrophilic character of the protein. Reverse micellar structural characteristics and the localization of the enzyme were examined by fluorescence quenching measurements and spectroscopic studies. AA

1284

Kurokawa (Y), Sano (T), Ohta (H) and Nakagawa (Y). **Immobilization of enzyme onto cellulose-titanium oxide composite fiber.** *Biotechnology and Bioengineering* 42(3); 1993; 394-397

Fibres of a cellulose-TiO_2 composite were prepared by the reaction of cellulose with titanium iso-propoxide. Enzymes were immobilized on the fibres easily and simply under mild conditions. The fibres were stable in common solvents, high ionic solutions, and over the range of pH values 3-10. AA

1285

Martin (A), Borja (R) and Chica (A). **Kinetic study of an anaerobic fluidized bed system used for the purification of fermented olive mill wastewater.** *Journal of Chemical Technology and Biotechnology* 56 (2); 1993; 155-162

Anaerobic microbial digestion of olive oil mill wastewater (OMW) in a fluidized bed, pretreated by aerobic fermentation with *Geotrichum candidum*, was studied. The bioreactor used (vol. = 3.5 dm^3; biomass concn. = 11.5 g volatile suspended solids dm^3) maintained satisfactory operation for 4-35 days, in terms of hydraulic retention time, and removed 92% of initial chemical oxygen demand. The system was used to develop and test a kinetic model which was subsequently employed to determine growth yield and maintenance coeff. From the results obtained, the Michaelis-Menten equation accurately described substrate uptake (i.e. chemical oxygen demand) in the anaerobic fluidized bed system. Pretreatment of OMW increased the rate of substrate uptake by a factor of 3.2 when compared to untreated OMW. AA

1286

Xu (J) and Taylor (KB). **Characterization of ethanol production from xylose and xylitol by a cell-free *Pachysolen tannophilus* system.** *Applied and Environmental Microbiology* 59(1); 1993; 231-235

Whole cells and a cell extract of *Pachysolen tannophilus* converted xylose to xylitol, ethanol, and CO_2. The whole-cell system converted xylitol slowly to CO_2 and little ethanol was produced, whereas the cell-free system converted xylitol quantitatively to ethanol (1.64 mol of ethanol per mol of xylitol) and CO_2. The supernatant solution from high-speed centrifugation (100 00 x gn) of the extract converted xylose to ethanol, but did not metabolize xylitol unless a membrane fraction and oxygen were also present. Fractionation of crude cell extract by gel filtration resulted in an inactive fraction in which ethanol production from xylitol was fully restored by the addition of NAD^+ and ADP. The continued conversion of xylose to xylitol in the presence of fluorocitrate, which inhibited aconitase, demonstrated that the tricarboxylic acid cycle was not the source of the electrons for the production of xylitol from xylose. Therefore, the source of the electrons is indirectly identified as an oxidative pentose-hexose cycle. AA

1287

Heng (MH) and Glatz (CE). **Charged fusions for selective recovery of β-galactosidase from cell extract using hollow fiber ion-exchange membrane adsorption.** *Biotechnology and Bioengineering* 42(3); 1993; 333-338

Use of charged fusions for selective recovery of β-galactosidase from cell extracts was investigated using a low-cost, easily scaled-up, fast, charge-based separation technique - ion exchange on hollow fibre ion-exchange membranes (HFIEM). The additional charges carried by a series of anionic fusion tails allowed selective binding and release of recombinant β-galactosidase from *Escherichia coli* cell extracts using the HFIEM cartridge. The purification factors increased with fusion length. The β-galactosidase was recovered in active form. For the longest fusion studied, more than 6-fold enrichment in specific activity was attained. Specific activity of the recovered fraction was comparable with that of commercial wild-type β-galactosidase and affinity-purified fusion proteins. AA

1288

Compagno (C), Tura (A), Ranzi (BM) and Martegani (E). **Bioconversion of lactose/whey to fructose diphosphate with recombinant *Saccharomyces cerevisiae* cells.** *Biotechnology and Bioengineering* 42(3); 1993; 398-400

Genetically engineered *Saccharomyces cerevisiae* strains that expressed *Escherichia coli* β-galactosidase genes were able to bioconvert lactose or whey into fructose-1,6-diphosphate (FDP). High FDP yields from whey were obtained at an appropriate ratio of cell concn. and inorganic phosphate. Results indicate that whey as a suitable C source for *Sacch. cerevisiae* growth and as the substrate for fructose diphosphate fermentations. BV

1289

Mosmuller (EWJ), Franssen (MCR) and Engbersen (JFJ). **Lipase activity in vesicular systems: characterization of *Candida cylindracea* lipase and its activity in polymerizable dialkylammonium surfactant vesicles.** *Biotechnology and Bioengineering* 42(2); 1993; 196-204

1290

Zhengjun (W) and Silva (NAda). **Improved protein synthesis and secretion through medium enrichment in a stable recombinant yeast strain.** *Biotechnology and Bioengineering* 42(1); 1993; 95-102

1291

Sebastiao (MJ), Cabral (JMS) and Aires (B-MR). **Synthesis of fatty acid esters by a recombinant cutinase in reversed micelles.** *Biotechnology and Bioengineering* 42(3); 1993; 326-332

Fusarium solani pisi recombinant cutinase, solubilized in bis(2-ethylhexyl) sodium sulphosuccinate (AOT)/isooctane-reversed micelles, was used to catalyse the esterification of fatty acids (FAs) with aliphatic alcohols. pH, W_0 (water/surfactant molar ratio), temp. and substrate concn. were optimized. Max. specific activity was obtained for hexanol. The cutinase showed selectivity for short-chain FAs. The stability of the microencapsulated cutinase was investigated at various concn. of water and different pH values. Oleic acid had a negative effect on cutinase stability, while hexanol was a strong stabilizer increasing the half-life of the enzyme approx. 45-times. BV

1292

Wittrup (KD), Weber (AL) and Tsai (P). **Microencapsulation selection for isolation of yeast mutants with increased secretion of *Aspergillus awamori* glucoamylase.** *Biotechnology and Bioengineering* 42(3); 1993; 351-356

A cell microencapsulation selection method is described which allows rapid and quantitative screening of > 10^6 yeast cells for enhanced secretion of *Aspergillus awamori* glucoamylase. The method provides a 400-fold single-pass enrichment for high-secreting mutants and may be adapted for application to growth-based selection schemes with other microorganisms and enzymes. BV

TISSUE CULTURE

Nil

FOOD ADDITIVES

1293

Madhusweta Das and Mukherjee (RK). **Biosurfactants: Promising substitutes for synthetic surface-active agents used as food additives.** *Indian Food Industry* 12(2); 1993; 22-26

The nature and functionality of food surfactants in different food items, chemical synthesis of food surfactants from oils and fats of plant and animal origins, the new alternative approach to chemical synthesis of food surfactants by the use of microorganisms known as biosurfactant, nature and applicability of biosurfactants and the economic and legal aspects involved are discussed in this article. CSA

1294

Tiefel (P) and Berger (RG). **Seasonal variation of the concentrations of maltol and maltol glucoside in leaves of *Cercidiphyllum japonicum*.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 59-61

Antimicrobial agents

1295

Matthews (PD) and Haas (GJ). **Antimicrobial activity of some edible plants: lotus (*Nelumbo nucifera*), coffee, and others.** *Journal of Food Protection* 56(1); 1993; 66-68

A number of edible plant species was investigated for antifungal agents. Whole sprouts and extracts of plant organs were tested in several assays, including bioautography. Amaranth, coffee (*Coffea arabica*), rice, coleus, violet, chervil and lotus (*Nelumbo nucifera*) showed antifungal activity. Rhizomes of lotus had potent antifungal activity against *Aspergillus niger*, *Trichoderma viride* and *Penicillium* spp. Further work is required for characterization of this antifungal agent. BV

Coatings

1296

Anon. **Food gums stick it out in dry mix glazes.** *Prepared Foods* 162(1); 1993; 53

A common problem with glaze toppings is that they are unable to adhere to foods during cooking. Thermal gelation causes the gums to gel when heated and then to return to their original viscosity when cooled. MethocelRegistered food gums from Dow Chemical Co., USA, are described that overcome the problem. When used with instant starches, they exhibit a synergistic increase in liquid viscosity. Thermal gelation converts the viscous sauce to a gelled glaze during cooking to reduce run-off. Glaze adhesion is also improved by the surface active properties of these gums; their colloidal properties cause them to cling readily to the food surface. MethocelRegistered gums create light, no calorie glazes that are maintained throughout freezing, thawing and cooking; they also have moisture control properties. The cellulose-derived gums can create glaze systems that range from thin coatings and sauces to dry mixes. The different gum product types and forms are described. AA

Stabilizers

Gums

1297

Amarjeet Kaur, Minhas (KS) and Sidhu (JS). **Natural and synthetic gums: Properties and uses in food industry.** *Indian Food Industry* 12(2); 1993; 27-32

Properties and uses of gums in viscosity building effects, stabilization of emulsions, suspension of particulates, control of crystallization, inhibition of syneresis, encapsulation, and formation of films and the classification of gums into natural gums, modified natural gums and purely synthetic gums are described in this article: (1) natural gums include: sea weed gums (agar, algin and alginates, carrageenan, furcellaran); plant exudates (gum arabic, gum tragacanth, gum karaya, gum ghatti, larch gum); plant seed gums (guar gum, locust bean gum, psyllium gum, quince gum, tamarind gum, okra gum, pineapple gum); cereal gums/starches; plant extracts; fermentation gums (xanthan gum, scleroglucan, pullulan, dextran, curdlan); animal derived gums (gelatin). (2) modified natural gums include: cellulose derivatives (methyl cellulose or hydroxy propyl/methyl cellulose, hydroxyl ethyl cellulose, microcrystalline celluose/sodium carboxy methyl cellulose); other derivatives (modified, oxidised and cross-linked starches, methoxyl pectin). (3) synthetic gums include: polyvinly pyrrolidone, carboxy vinyl polymers, methyl vinyl ether/maleic anhydrate polymers, ethylene oxide polymers. CSA

CEREALS

1298

Haridas Rao (P) and Venkateshwar Reddy (K). **Specific flours: Production and quality control.** *Indian Miller* 24(1); 1993; 109-114

Some of the practical methods to produce specific flours and their quality control such as selection of suitable wheats: blending of wheat, flour streams and flour; air classification of flour; flour treatment; and quality control (moisture, colour, total ash, acid insoluble ash, gluten content, gluten quality, diastatic activity, damaged starch dough characteristics) are detailed. SRA

1299

Jain (RK) and Srivastav (PP). **Low-cost traditional and improved devices for roasting and puffing of grains.** *Indian Food Industry* 12(2); 1993; 33-37

This article describes the conditioning of grains which involves pre-treatment with moisture, roasting, de-hulling and grinding of grains; traditional and improved devices for puffing and roasting of grains; decription, techniques and special features of the grain puffing machines. Tables showing the performance and the economy of using the grain puffing machine is presented. CSA

Oats

1300

Johansson (ML), Molin (G), Jeppsson (B), Nobaek (S), Ahrne (S), Bengmark (S). **Administration of different *Lactobacillus* strains in fermented oatmeal soup: *in vivo* colonization of human intestinal mucosa and effect on the indigenous flora.** *Applied and Environmental Microbiology* 59(1); 1993; 15-20

Rice

1301

Locatelli (DP) and Daolio (E). **Effectiveness of carbon dioxide under reduced pressure against some insects infesting packaged rice.** *Journal of Stored Products Research* 29(1); 1993; 81-87

A study on the combination of low pressure, increased temp. and CO_2 exposure for effectively disinfesting rice in gas permeate packaging was carried out. Tests were carried out on *Rhyzopertha dominica* (F), *Sitophilus oryzae* (L.), *Oryzaephilus surinamensis* (L.) and *Plodia interpunctella* (Hbn), in a vacuum autoclave 34.6-44.00 kPa operating at 20, 25, 30, 35 or 40°C with CO_2 exposure times of 6, 12, 18, 24, 30, 36, 48 or 54 h. Survival of any stage of development of these spp. could be prevented by treatment for 54 h at 20°C, 30 h at 25°C, 24 h at 30°C, 18 h at 35°C, or 12 h at 40°C. Adults proved particularly susceptible, and a 24-h exposure at 20°C, or 6 h at > 30°C, achieved 100% mortality. Eggs of *R. dominica* and mature larvae and pupae of *P. interpunctella* were particularly tolerant at 20°C, and 54 and 48 h of exposure were required, respectively, to prevent their survival. BV

Wheat

1302

Sekhon (KS), Nagi (HPS) and Singh (N). **Effect of field sprouting of wheat on bread and chapati making properties.** *Indian Miller* 24(1); 1993; 15-20

Wheat crop in Punjab State, India was severely damaged by the extensive rains. Various rain damaged wheat samples were conditioned with water to have 14 and 16% moisture and rested for 24 h for complete permiation of moisture and milled. Suitability of flour tested for chapathi making. All the samples developed discoloration and turned black during subsequent storage. The increased respiration of wet grains during germination and storage decreased the grain wt. Flour from these grains were poor in quality with lower gluten, water absorption and falling number, resulting dough handling problem due to stickiness. Chapathis prepared from this flour was acceptable but their colour was dark. The rain affected samples, being free of aflatoxins had higher load of fungi as compared to normal wheat. SRA

MILLETS

Corn

1303

Taylor (SL), King (JW), Richard (JL) and Greer (JI). **Analytical-scale supercritical fluid**

extraction of aflatoxin B_1 from field-inoculated corn. *Journal of Agricultural and Food Chemistry* 41(6); 1993; 910-913

Analytical-scale supercritical fluid extraction (SFE) was used to remove aflatoxin B_1 from field-inoculated corn samples. Various pressures (2000-15 000 psig), temp. (40-80°C), quantity of supercritical carbon dioxide (SC-CO_2, 50-500 ml of liquid CO_2) and organic modifiers were used to optimize extraction. Addition of an organic modifier to the SC-CO_2 was found to be essential to achieve high aflatoxin B_1 recoveries. Modifier additions of 5-20% by vol. of an acetonitrile/methanol (2:1) mixture or isopropyl alcohol were tested. Analysis of extracts was performed with HPLC coupled with fluorescence detection of the trifluoroacetic acid derivative. Recoveries were maximized by increasing the CO_2 pressure to 5000 psig and organic modifier level to 10-15% (v/v). The SFE method yielded greater than 90% analyte recovery when compared to conventional solvent extraction procedures. Attempts to remove coextracted lipid matter by a supercritical fluid-based cleanup method are also described. The precision of the method is affected by size and homogeneity of corn samples. AA

1304

Kumar (S), Sinha (RK) and Prasad (T). **Propionic acid as a preservative of maize grains in traditional storage in India.** *Journal of Stored Products Research* 29(1); 1993; 89-93

Maize cv. Diara composite was treated with graded concn. (1-5 ml/kg) of propionic acid (PA) to evaluate its effectiveness as a grain preservative in Indian traditional storage structures (kothi (an indoor earthen cylindrical container); bukhari (an outdoor thatched cylindrical container); and gunny bags). A concn. of 2 ml/kg was effective in inhibiting growth of fungi for 12 months in grains stored under gunny bags. For kothi and bukhari the effective concn. was 3 ml/kg. Germinability and nutritional components of the grains were maintained at these concn. After 12 months of storage, germination was 77, 75 and 74% for gunny bags, bukhari and kothi samples, respectively. Protein, sugar, reducing sugars and starch losses were slight in treated samples during 12 months of storage. Difference in efficacy of PA treatment in relation to storage structure was negligible. BV

1305

Clarke (B). **A powdered chemical mixer for bagged grain.** *Journal of Stored Products Research* 29(1); 1993; 15-17

A machine is described for mixing powdered insecticide with maize stored in bags, which avoids the problem of tipping the grain on to the ground. A 100 kg bag can be fully treated in under 5 min compared to at least 15 min using other available methods. The machine based on the cone and drum principle can be easily constructed in a developing country for the equivalent of about 150 sterling. AA

1306

Choudhary (AK) and Sinha (KK). **Competition between a toxigenic *Aspergillus flavus* strain and other fungi on stored maize kernels.** *Journal of Stored Products Research* 29(1); 1993; 75-80

Samples of Diara composite var. of maize were collected at harvest and stored for 52 wk. The incidence of *Aspergillus flavus* in relation to competing fungi (including *Penicillium*, *Alternaria*, *Fusarium* and other *Aspergillus* spp.) on individual maize kernels was observed periodically. Temp., RH and substrate moisture were found to influence competition with *Asp. flavus*. Toxigenic isolates of *Asp. flavus* had the highest incidence during the monsoon season (63%), followed by winter (52%). Aflatoxin B1 production by a toxigenic isolate of *A. flavus* (BUML-608) on maize was inhibited (14-100%) in a competitive environment. Accumulation of aflatoxin B1 in stored maize was highest during the monsoon (1360 μg/kg). A decline (33%) in the level of aflatoxin B1 was observed during the winter. AA

Pearl millets

1307

Seitz (LM), Wright (RL), Waniska (RD) and Rooney (LW). **Contribution of 2-acetyl-1-pyrroline to odors from wetted ground pearl millet.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 955-958

The odourous compound 2-acetyl-1-pyrroline (2AP) caused an undesirable 'mousy' odour in raw pearl millet (PM) grits when wetted and dried slowly. The 2AP in PM was identified by comparing GC retention times, odour at the GC sniffing port, mass spectra and vapour-phase IR spectra with those of 2AP from Jasmine and Indian basmati aromatic rices. Identification of 2AP in aromatic rices had been reported previously. The odour of 2AP at the sniffing port was similar to the undesirable odour in bulk samples of wetted PM grits and was the key factor in identifying 2AP as the aroma component. Both blue and yellow raw PM grits produced 2AP and the mousy odour. BV

PULSES

1308

Guenes (B) and Bayindirli (A). **Peroxidase and lipoxygenase inactivation during blanching of green beans, green peas and carrots.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 406-410

The present study reports the effects of water- and microwave blanching methods on activities of peroxidases and lipoxygenases, and ascorbic acid retention in green beans, peas and carrots. Lipoxygenases and peroxidases were used to indicate the adequacy of blanching treatments. Inactivation kinetics of the enzyme were also estimated. A first order kinetic model was assumed to analyse thermal inactivation of the enzyme systems which consist of heat labile and heat resistant fractions. The average loss of ascorbic acid after water blanching at 96°C was approx. 90% for peas, 72% for carrots and 98% for green beans, with retention of 10% of peroxidase activity. Ascorbic acid loss was 15 and 25% for peas and green beans, respectively, when a lipoxygenase activity of 10% remained. Lipoxygenase activity in carrots was not detected during the experiments. With microwave blanching, loss of ascorbic acid was 53, 34 and 72% for peas, green beans and carrots, respectively, when 90% reduction in peroxidase activity wasachieved. Ascorbic acid loss was 36% for peas and 15% for beans when the remaining lipoxygenase activity was 10%. It is concluded that in water- or microwave blanching in which lipoxygenase is the indicator enzyme, the retention of ascorbic acid is higher compared to when peroxidase is the indicator. The less severe heat treatment required to inactivate lipoxygenases should result in improved product flavour, colour, texture and nutritional values of the vegetables. BV

Blackgram

1309

Ahmad (SK). **Mycoflora changes and aflatoxin production in stored blackgram seeds.** *Journal of Stored Products Research* 29(1); 1993; 33-36

Fungal populations and aflatoxin production were investigated in black gram (*Vigna mungo*) stored for 1 yr in gunny bags or airtight metal bins. At harvest, seeds contained a combination of field and storage fungi (*Alternaria*, *Cladosporium*, *Fusarium* and *Curvularia* spp.). These moulds gradually disappeared in storage, though *Alternaria* and *Fusarium* survived for a comparatively long period. Seed infection by *Aspergillus flavus* and *Penicillium citrinum* was observed during harvesting. Their density increased considerably in storage along with *Asp. terreus*, *Asp. niger*, *Asp. ochraceus*, *Rhizopus stolonifer* and *Chaetomium* spp. Almost 70% of *Asp. flavus* isolates were found to be toxigenic. Aflatoxin contamination was not detected until after 3-4 months of storage and depended on the storage system: closed metal bins restricted air exchange, so reducing oxygen thus causing lower production of aflatoxins. Greater amount of aflatoxins were detected in samples stored in gunny bags; highest amounts (108.4 μg/kg) occurred in gunny bag samples in the wet season. BV

Chickpeas

1310

Singh (KB), Bejiga (G) and Malhotra (RS). **Genotype-environment interactions for protein content in chickpea.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 87-90

Cowpeas

1311

Aluko (RE) and Yada (RY). **Relationship of hydrophobicity and solubility with some functional properties of cowpea (*Vigna unguiculata*) protein isolate.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 331-335

The relationship of hydrophobicity and solubility with some functional properties of cowpea protein isolate was determined. Cowpea protein isolate was prepared by alkali extraction followed by precipitation at pH 4.5. The precipitated proteins were then neutralized to pH 7. Heating of the protein isolate to 100°C for 10 min followed by cooling to room temp. resulted in a significant (P less than or equal to 0.05) decrease in aromatic hydrophobicity (ARH) when compared to the native protein isolate. Inclusion of SDS during heating gave a significant ($P < 0.05$) 1.7-fold increase while inclusion of mercaptoethanol (ME) gave a significant (P less than or equal to 0.05) 2.5-fold increase in ARH of the cooled protein solution. Protein solubility (PS), foam expansion (FE) and emulsification activity index (EAI) of the isolate generally increased significantly (P less than or equal to 0.05) upon heating or treatment with urea or SDS or a combination of SDS and ME. Backward stepwise multiple regression was used to obtain equaltions for predicting emulsifying and foaming properties of the protein isolate from solubility and hydrophobicity parameters. PS, ARH and aliphatic hydrophobicity (ALH) were important in predicting foam stability and emulsion stability, while PS and ALH were important for predicting FE. ALH alone was important for predicting EAI. AA

1312

Piergiovanni (AR), Gatta (C-della) and Perrino (P). **Effects of storage conditions on the trypsin inhibitor content in flour and whole seeds of cowpea (*Vigna unguiculata*).** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 426-429

Portions of cowpea seeds and meal were stored in a desiccator at either -20, 4 or 40°C; samples were also stored at 40°C and 95% RH in beakers placed in closed glass jars containing a small amount of water. Storage at 4 or 40°C reduced antitryptic activity by 20-30%. At 40°C, 95% RH, the max. rate of trypsin inhibitor activity disappearance was found. When the samples were stored at -20°C, the initial levels of inhibitors remained unchanged for up to 130 days. Milling of the cowpeas to meal before storage did not prevent or improve loss of antitryptic activity. BV

Lentils

1313

Bernabe (M), Fenwick (R), Frias (J), Jimenez Barbero (J), Price (K), Valverde (S), Vidal Valverde (C). **Determination, by NMR spectroscopy, of the structure of ciceritol, a pseudotrisaccharide isolated from lentils.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 870-872

An unknown pseudotrisaccharide was isolated from *Lens culinaris* seeds. NMR spectroscopy of the substance established unambiguously its structure as α-D- galactopyranosyl-(16)- α-D-galactopyranosyl- (12)-4-O- methyl-*chiro*-inositol. This compound received the trivial name of ciceritol. It was previously identified as manninotriose. AA

Lupins

1314

Muzquiz (M), Ridout (CL), Price (KR) and Fenwick (GR). **The saponin content and composition of sweet and bitter lupin seed.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 47-52

Seeds of 6 sp. of lupin (*Lupinus albus* (sweet and bitter), *L. angustifolius* (sweet and bitter), *L. luteus* (sweet and bitter), *L. hispanicus*, *L. consentinii* (lagao/faro) and *L. mutabilis*) were analysed for total saponin content and sapogenol composition. The saponin content ranged from 0 to 470 mg kg^{-1} with none being detected in *L. albus*; 56.7 and 68.3 mg kg^{-1} in *L. luteus* (sweet and bitter, respectively); 107.9 mg kg^{-1} in *L. mutabilis*; 302.7 mg kg^{-1} in *L. hispanicus*; 216.1 mg kg^{-1} in the *L. consentinii*; and 270.1 and 469.5 mg kg^{-1} in *L. angustifolius* (sweet and bitter, respectively). 3 saponins were detected, 1 containing soyasapogenol B and considered to be identical to soyasaponin 1, the other 2 being bisdesmosides of soyasapogenol A. Ratio of the 2 sapogenols in the overall saponin mixture varied between 0.3:1 and 3.1:1. AA

Peas

1315

Daveby (YD), Abrahamsson (M) and Aman (P). **Changes in chemical composition during development of three different types of peas.** *Journal of the Science of Food and Agriculture* 63 (1); 1993; 21-28

Three Swedish pea (*Pisum sativum* L.) cv., Timo (dark-coloured seed), Vreta (light-coloured seed) and Capella (light-coloured seed and leafless), were harvested at different stages of seed maturity and dehulled by hand. Changes in chemical composition during growth and maturation were analysed in dehulled seeds and dietary fibre components in the hulls (seed coats). Generally, Capella had the largest seeds, lowest hull content, highest yield and lowest losses due to pod opening. Timo had the highest hull content. Concn. of sucrose and glucose + fructose was high in the young dehulled seeds and decreased rapidly until the starch concn. reached its max. early during development. Thereafter, the starch concn. decreased somewhat while the concn. of crude protein and oligosaccharides belonging to the raffinose series increased. Glutamic acid (the predominant amino acid in dehulled seeds), arginine, alanine, threonine and methionine had the highest concn. in the very young dehulled seeds but decreased rapidly. Concn. of the other amino acids, including cyst(e)ine and lysine, was low in the young seeds and thereafter increased. Concn. of dietary fibre and major dietary fibre components in dehulled seeds generally increased during growth and maturation. Dietary fibre concn. in hulls also increased dramatically during growth and maturation. The light-coloured hulls contained more non-starch polysaccharides, including glucose, uronic acid and xylose residues as major components, but lower concn. of Klason lignin compared to the dark coloured hulls. AA

OILSEEDS AND NUTS

1316

Mondhe (OPS) and Rao (JT). **Studies on non-conventional oilseeds: Search for new sources of edible and industrial oils.** *Journal of the Indian Chemical Society* 70(1); 1993; 53-55

Ougeinia dalbergioids Benth. seeds of forest origin were investigated for their fatty oil constituents and some applications of the oil to edible as well as industrial purposes like alkyed resins and other oil-derived products. Oil was prepared incorporating azoalkyed disperse dyes by step by step process of polymerisation, co-polymerisation, diazotisation and coupling with phenolic compounds. Prepared dyes were studied for application on polyester, nylon and wool fabrics as azo disperse dyes. AA

Colletia spinosissima

1317

Zygadlo (JA) and Guzman (CA). **Chemical composition of *Colletia spinosissima* seeds.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 95-96

Colletia spinosissima is a small shrub of the Argentina forest. Oil and protein contents were 500 and 250 g/kg, respectively. The major fatty acids in the oil were oleic (448 g/kg), linoleic (232 g/kg) and linolenic (151 g/kg). Sitosterol was the main component of the sterol fraction. BV

Cottonseeds

1318

Liadakis (GN), Floridis (A), Tzia (C) and Oreopoulou (V). **Protein isolates with reduced gossypol content from screw-pressed cottonseed meal.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 918-922

Gossypol was removed from cottonseed meal by successive extractions with organic solvents. 1-Butanol hydrochloride was found the most suitable solvent, reducing free gossypol content to the safe level of 0.0104% after 3 extractions. Protein isolates, with a protein content of 85%, were produced from raw and butanol-treated meals with yields of 50-80% based on extracted proteins. The isolates were light coloured and had a bland flavour. The butanol treatment influenced protein isolation yield, lowering protein extractability, as confirmed by chromatographic analysis, but did not affect significantly functional properties of the proteins. AA

Groundnuts

1319

Hashim (IB), Koehler (PE) and Eitenmiller (RR). **Tocopherols in runner and virginia peanut cultivars at various maturity stages.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 633-635

1320

Clavero (MRS), Hung (YC), Beuchat (LR) and Nakayama (T). **Separation of aflatoxin-contaminated kernels from sound kernels by hydrogen peroxide treatment.** *Journal of Food Protection* 56(2); 1993; 130-133, 156

Blends (0:1, 1:3, 1:1 and 3:1, wt./wt.) of aflatoxin-contaminated and sound peanut kernels were submerged for 1, 2 and 3 min in various concn. of H_2O_2 sol. Effectiveness of these treatments in separating aflatoxin-contaminated kernels from sound kernels was determined. Peanuts that floated (floaters) and those that did not (sinkers) were subjected to aflatoxin analysis. 2nd order polynomial equations were satisfactorily fitted to experimental data. H_2O_2 concn. of 0.075, 0.150 and 0.25% resulted in a reduction in aflatoxin content in the kernels in the sinker fraction by 90% within 1 min, regardless of the initial aflatoxin content. The total aflatoxin content in sinker and floater fractions was approx. the same as that in unfractionated samples, indicating that the low concn. of H_2O_2 in treatment solutions did not degrade aflatoxin. Response surface methodology was used to generate contour plots which revealed optimum treatment conditions for giving a max. yield of the sinker fraction with low aflatoxin content. For peanuts containing 50 p.p.b. aflatoxin, optimum conditions were 0.08% H_2O_2 treatment for 0.7 min. This procedure results in a max. sinker fraction yield of 85.5% of the original lot with a residual aflatoxin content of less than or equal to 5 p.p.b. AA

1321

Bansal (U-K), Satija (DR) and Ahuja (KL). **Oil composition of diverse groundnut (*Arachis hypogaea* L.) genotypes in relation to different environments.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 17-19

Groundnut genotypes belonging to diverse growth habits, namely Spanish bunch, Virginia runner and Virginia bunch, were evaluated for oil content and fatty acid composition in 4 environments. Variability for oil content and fatty acids was significant, within as well as between growth habits, in all the environments. Oil content was independent of growth habit. However, the different fatty acid contents were related to growth habit. Both traits were significantly influenced by environmental fluctuations. Oleic acid concn. was highest in the genotypes belonging to Virginia runner, followed by that of Virginia bunch and a min. in the Spanish bunch type. This trend was reversed with respect to linoleic acid concn. Virginia runner genotypes, having a higher oleic/linoleic acid ratio, yielded a low iodine value oil which had a longer shelf life. The genotypes with Spanish bunch type of growth habit possessed a higher linoleic acid content and can be used as a source of refined oil. AA

1322

Clavero (MRS), Hung (YC), Beuchat (LR) and Nakayama (T). **Catalase content in peanut milk as affected by growth of *Aspergillus parasiticus*.** *Journal of Food Protection* 56(1); 1993; 55-57

Changes in catalase content and pH of peanut [*Arachis hypogaea* L. cv. Florunner] milk in which *Aspergillus parasiticus* was cultured were monitored over a 10-day period at 30°C. A 3- to 10-fold increase in catalase content was detected after 6 days incubation; while the content in uninoculated (control) peanut milk decreased by about 50% after 3 days incubation. The pH of uninoculated catalase-supplemented peanut milk increased from 6.7 to 9.2, whereas pH of inoculated peanut milk remained essentially unchanged. Production of catalase by *Asp. parasiticus* and perhaps other moulds could be a basis for developing an H_2O_2 treatment for separating mould-contaminated kernels from sound kernels. AA

Rapeseeds

1323

Bielewicz (J), Cenkowski (S) and Muir (WE). **Pretreatment effects on equilibrium moisture contents of canola.** *Journal of Stored Products Research* 29(1); 1993; 37-44

Equilibrium moisture content (e.m.c.) tests were conducted at 25°C for canola samples (*Brassica napus* L., cv. Westar) grown at different locations and in different yr. The effects of different storage pretreatments (long-term compression stress, irradiation and drying/rewetting cycles) on the e.m.c. characteristics of canola and its hysteresis loop were also investigated. Canola harvested at different locations in the same yr showed differences in e.m.c. properties and in its hysteresis loop; the difference in e.m.c. between adsorption in these samples was 0.9% dry basis. Canola e.m.c. behaviour was not affected by long-term compression stress or by irradiation with a 10 kGy dose. Drying and rewetting caused a widening of the hysteresis loop, possibly due to heat damage, development of cracks and fungal growth. BV

Soybeans

Soy products

Soy milk

1324

Tuitemwong (P), Erickson (LE), Fung (DYC) and Tuitemwong (K). **Effect of processing temperatures on microbiological and chemical quality of soy milk produced by rapid hydration hydrothermal cooking.** *Journal of Food Processing and Preservation* 17(3); 1993; 153-175

Soy milk samples produced from 11% soybean slurry by the rapid hydration hydrothermal cooking (RHHTC) process (temp. from 105-157°C for 24-90 s) were studied for sterility, microbiological quality, flatulent sugar reduction and physical characteristics. Soy milk produced at a temp. of 132 C, or higher, for 29 s or longer was sterile. Bacteria (including cells and spores of *Pseudomonas aeruginosa*, *Serratia liquefaciens*, *S. rubidaea* and *Enterobacter cloacae*) were completely destroyed. At lower temp. 105-127°C, Gram negative bacteria were destroyed; however, spores of the Gram positive bacteria *Bacillus licheniformis* and *B. cereus*, survived processing temp. Temp. of 143-157°C combined with a retention time for soy slurry solids of 30 s or longer are recommended to serilize soymilk. Mean residence time of soy solids processed by the RHHTC unit was 30 s. AA

Soy proteins

1325

Jie (Z), Tung (C-L) and Chi (T-H). **Kinetics and mechanism of nonenzymatic deamidation of soy protein.** *Journal of Food Processing and Preservation* 17(4); 1993; 259-268

Nonenzymatic deamidation of glutamine and asparagine residues of soy protein (SP) in aqueous solutions of varying pH (3.0, 5.0, 7.0, 9.0 and 11.0) at different temp. (100, 115 and 130°C) was monitored over a period of time. Deamidation of SP followed 1st-order kinetics. Activation energies (Ea) of SP deamidation at different pH ranged from 14 to 27 Kcal/mol. Activation energies were highly pH-dependent and decreased very sharply as pH increased from 5 to 11. AA

1326

Gifford-Steffen (SR) and Clydesdale (FM). **Effect of varying concentrations of phytate, calcium, and zinc on the solubility of protein, calcium, zinc, and phytate in soy protein concentrate.** *Journal of Food Protection* 56(1); 1993; 42-46

The phytate x Ca:Zn mmol ratio was varied in a number of soy protein concentrates subjected to sequential pH treatment to simulate gastrointestinal conditions. In 2 independent studies, Ca was either decreased incrementally from 4.94 to 0.25 mmol or Zn was increased from 0.0036 to 0.55 mmol. At the lowest level of Ca, a significant increase ($P < 0.01$) in soluble Zn and soluble phytate was observed at pH 5.5, due to the possible formation of a soluble Ca-phytate-Zn complex. Soluble Zn significantly increased ($P < 0.01$) only when the level of Zn was raised to 0.55 mmol. Neither soluble Ca nor soluble phytate was altered at this level. AA

Soy sauce

1327

Iwasaki (K), Nakajima (M) and Sasahara (H). **Rapid continuous lactic acid fermentation by immobilised lactic acid bacteria for soy sauce production.** *Process Biochemistry* 28(1); 1993; 39-45

Continuous lactic acid fermentation was carried out to produce an appropriate feed solution for rapid ethanol fermentation in soy sauce production. Lactic acid bacteria, immobilized in porous alumina ceramic beads, were used to ferment a filtered extract of soy sauce mash. Lactic acid concn. was controlled by dilution rate. Volumetric production rate was dependent on dilution rate but was much higher than in batch fermentations. Lactic acid productivity was modelled mathematically. Simulated results were in close agreement with experimental results. AA

Soybean meal

1328

Velisek (J), Ledahudcova (K), Kassahun (B), Dolezal (M) and Kubelka (V). **Chlorine-containing compounds derived from saccharides in protein hydrolysates. II. Levulinic acid esters in soybean meal hydrolysates.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 430-433

Volatile compounds in traditionally manufactured soy meal hydrolysates (used as food seasonings and savoury flavours), as well as in hydrolysates treated with alkali, were analysed and quantitated by GC and GC-MS. Two isomeric esters, 3-chloro-2-hydroxy-1-propyl and 3-chloro-1-hydroxy-2-propyl levulinate were identified and were present at a level of 0.6-1.1 mg/kg. The esters were derived from 3-chloro-1,2-propanediol arising from residual lipids and levulinic acid formed via 5-hydroxymethyl-2-furancarboxaldehyde from saccharides. The esters totally decomposed in alkaline media. BV

Tofu

1329

Fouad (KE) and Hegeman (GD). **Microbial spoilage of tofu (soybean curd).** *Journal of Food Protection* 56(2); 1993; 157-164

Plate counts and pH measurements were performed on tofu samples stored for 1, 30, 37, 62 and 101 days at 2-3°C. pH declined from 5.8 to 5.2 during storage. Aerobic plate counts of 1 and 30 day old samples were approx. 10^6 cfu/g. Older [63 and 101 day] samples had counts of approx. 10^8 cfu/g. Anaerobic counts rose from 10^6 cfu/g in the 1 day old samples to a high of 10^9 cfu/g in the 30 day old samples. Major bacterial spp. were lactic acid bacteria, enteric bacteria and *Pseudomonas* spp. Representatives from each of these groups were inoculated into autoclaved tofu and incubated at 5°C for 23 days. Values of cfu/ml and pH for both water and cake were also measured. Turbidity, mg protein/ml and mg NH_4^+/ml water were also measured. All spp. tested increased in numbers in the tofu and caused changes in some of the characteristics measured. Samples were taken during manufacture of tofu, and organisms found were characterized. All organisms that were shown capable of causing spoilage in tofu were present in large numbers early in the manufacture but were no longer found in samples subsequent to pressure cooking. All spoilage organisms reappeared later during the manufacture process. These data indicate that tofu is spoiled by enteric bacteria and *Pseudomonas* spp., as well as by lactic acid bacteria. Spoilage organisms are probably introduced by equipment and personnel with which the product comes into contact after it is pressure cooked. In addition, aerobic plate counts can underestimate the bacterial load in tofu, and therefore anaerobic plate counts should also be performed. CSA

TUBERS AND VEGETABLES

Cassava

1330

Adewusi (SRA) and Bradbury (JH). **Carotenoids in cassava: comparison of open-column and HPLC methods of analysis.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 375-383

Cassava leaves and tubers from 6 cv. were analysed for carotenoids by both open-column chromatography and HPLC. The major carotenoids of leaves were the non-vitamin A carotenoid lutein (86-290 mg/kg fresh wt. (FW)). Immature leaves contained less than mature leaves. Tubers contained 0.1-3 mg/kg FW of β-carotene and 0.05-0.6 mg/kg FW of lutein. Carotenoids present in small amounts included α-, γ-, and zeta-carotenes and β-cryptoxanthin and others were separated and partially identified. Yellow tubers contain much more β-carotene than white tubers and cassava is a good source of pro-vitamin A carotenoids compared with other root crops. Both methods gave similar results for β-carotene and lutein, but the open-column method did not allow separation and quantitation of carotenoids present in small amounts. HPLC separated many carotenoids, but most peaks could not be identified for lack of reference compounds. A great advantage of open-column chromatography for developing countries is its use of simple equipment and readily available reagents and solvents compared with HPLC, which requires complex equipment needing careful maintenance and expensive solvents. The open-column method is more labour intensive but this is not a constraint in developing countries. AA

Potatoes

1331

Mondy (NI) and Munshi (CB). **Effect of type of potassium fertilizer on enzymatic discoloration and phenolic, ascorbic acid, and lipid contents of potatoes.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 849-852

Two sources of potassium fertilizer, KCl and K_2SO_4, were compared as to their effect on enzymic discoloration and phenolic, ascorbic acid and lipid concn. of Ontario and Pontiac potatoes. Each K source was applied at the rate of 627.2 kg/ha K_2O equivalent prior to planting of seed potatoes. Both sources of K fertilization significantly ($P < 0.01$) decreased enzymic discoloration and phenolic concn. and increased ascorbic acid, lipid and water contents of both Ontario and Pontiac cv. Greater changes occurred using KCl than with K_2SO_4. AA

1332

Brandon (DL), Binder (RG), Wilson (RE) and Montague (WCJr). **Analysis of thiabendazole in potatoes and apples by ELISA using monoclonal antibodies.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 996-999

Thiabendazole [2-(4-thiazolyl)- 1H-benzimidazole, TBZ] is used as a preharvest or postharvest fungicide on pome fruits, citrus, bananas, potatoes and several other commodities. An ELISA method was developed for detection of thiabendazole. Antibodies were elicited using the hapten 5-succin amido-2-(4-thiazolyl)benzimidazole. TBZ is extracted from samples using water or aqueous buffers. The method can be completed within 4 h. Results were validated by comparison with chromatographic fractionation with UV detection. The ELISA method using aqueous extraction of apple or potato peel had a limit of detection of < 0.2 p.p.m. Since US federal tolerances for residues of TBZ in potatoes and apples are 10 p.p.m., this rapid screening test has sufficient sensitivity for regulatory monitoring of residues. AA

1333

Onyeneho (SN) and Hettiarachchy (NS). **Antioxidant activity, fatty acids and phenolic acids compositions of potato peels.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 345-350

The effects of freeze-dried extracts from the peels of 6 potato var. as antioxidants in pure soybean oil were investigated using the active oxygen method (AOM) procedure, carotene bleaching and linoleic acid oxidation experiments on TLC plates. At 9 h under AOM conditions, 20 g soybean oil treated with 0.05 g of these extracts attained lower peroxide values (PV, 22.0-28.0 meq kg^{-1}) than the control oil sample (PV, 109.0 meq kg^{-1}) indicating very strong antioxidant activities. Oils treated with the same amount of TBHQ, BHA-BHT mixture and rosemary extract attained PV of 10.0, 19.0 and 16.0 meq kg^{-1}, respectively. Results of the carotene bleaching and linoleic acid oxidation experiments on TLC plates indicated that the antioxidant activities of these extracts were due to the presence of phenolic acids. Among the phenolic acids separated and identified by both HPLC and TLC, chlorogenic, protocatechuic and caffeic acids were predominant and appeared to be mainly responsible for the strong antioxidant activities of the extracts. Peels from the red potatoes contained more polyphenols than those from the brown-skinned var., but their oil contents were similar. AA

Vegetables

1334

Chen (BH), Chuang (JR), Lin (JH) and Chiu (CP). **Quantification of provitamin A compounds in Chinese vegetables by high-performance liquid chromatography.** *Journal of Food Protection* 56(1); 1993; 51-54

The provitamin A contents of 16 vegetables grown in Taiwan were analysed by HPLC with photodiode-array detection. The amounts of the major provitamin A compounds, β-cryptoxanthin, α-carotene and β-carotene were 0-6.8, 0-27.7 and 0.6-104.9 μg/g, respectively. The highest β-carotene content (μg/g) was found in basil (104.9), followed by onion fragrant (92.0), kale (70.3), carrot (53.8), spinach (26.1), water convolvulus (19.8), mustard (16.0), green onion (15.1), garland chrysanthemum (12.8), sweet potato (8.5), green pepper (2.9), yellow corn (2.5), mustard stem (2.3), lettuce (1.7), cabbage (0.9) and celeriac (0.6). Carrot was the only vegetable found to contain α-carotene (27.7 μg/g) while corn was the only vegetable to contain β-cryptoxanthin (2.9 μg/g). AA

Asparagus

1335

Lescano (G), Narvaiz (P) and Kairiyama (E). **Gamma irradiation of asparagus (*Asparagus officinalis*, var. Argenteuil).** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 411-416

The effect of γ-radiation to improve the keeping quality of Argenteuil asparagus spears was investigated, under the packaging and storage conditions in which it is usually exported from Argentina. Asparagus, packaged in polystyrene foam trays and wrapped with PVC film, was irradiated 1 day after harvest with 0, 1.0, 1.5 and 2.0 kGy, and stored at 3 plus/minus 2°C and 92 plus/minus 5% RH. Bract and stem growth, desiccation and appearance of visible fungal mycelia were delayed by irradiation; colour and flavour were also maintained. Shelf-life of the asparagus was doubled when a dose of 2 kGy was used. During storage, wt. loss increased linearly; however, there were no significant differences between control and irradiated samples. In irradiated samples, shear force and acidity values were slightly higher than those of the control, particularly towards the end of storage. Mesophilic bacteria, fungi and yeasts were reduced by greater than 3 orders of magnitude when the 2 kGy irradiation treatment was used; levels remained the same during storage. BV

Bell peppers

1336

Gonzalez (G) and Tiznado (M). **Postharvest physiology of bell peppers stored in low density polyethylene bags.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 450-455

Physiological effects of waxing and modified atm. packaging were studied on the market quality of peppers (*Capsicum annuum* L.). The mature green peppers were stored at 10°C and 75% RH using 2 LDPE films. The thickness and permeability to O_2 and water vapour of the films were determined. At 3-day intervals, O_2 and CO_2 levels in the pack atm. were determined. At 10-day intervals, peppers were assessed for changes in colour, wt. loss, soluble solids, titratable acidity, pH, % decay and sensory properties. Fruit senescence was delayed in waxed and packaged peppers, and change of colour, wt. loss, firmness and % decay were reduced compared to waxed and unwrapped peppers. No abnormal flavours were detected in peppers stored at 10°C for up to 40 days. Results indicate that use of waxing together with packaging in LDPE bags can prolong shelf life without affecting quality. BV

Brinjal

1337

Raha (P), Banerjee (H), Das (AK) and Adityachaudhury (N). **Persistence kinetics of endosulfan, fenvalerate, and decamethrin in and on eggplant (*Solanum melongena* L.).** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 923-928

Persistence studies of endosulfan, decamethrin and fenvalerate in and on fruits and leaves of aubergines under field conditions of eastern India were undertaken after spraying at the recommended and twice recommended rates. Initial deposits of applied insecticides were higher on leaves than on fruits. Residues of endosulfan and fenvalerate in and on fruit were below the tolerance level of 2 p.p.m. as specified by FAO/WHO immediately after application at the recommended rate, whereas decamethrin required 4.32 days to decrease to below the tolerance level. Waiting periods (defined as the time required to decrease the residue to below the tolerance level) of 2.57, 6.50 and 0.14 days were calculated for endosulfan, decamethrin and fenvalerate, respectively, when double the recommended rate was applied. Approx. 50-70% of remaining insecticide residues were dissipated during washing followed by cooking. AA

Cocoyam

1338

Nwana (IE). **A survey of storage *Coleoptera* which attack dried cocoyam chips in Nigeria.** *Journal of Stored Products Research* 29(1); 1993; 95-98

In a survey of 5 storage locations in Anambra State, Nigeria, 13 spp. from 11 families of the *Coleoptera* were isolated from dried cocoyam chips. These included primary grain pests such as *Araecerus fasciculatus*, *Dinoderus procellus*, *Rhizopertha dominica*, *Sitophilus zeamais* and *Tenebroides mauritanicus*, bran and flour beetles like *Brachypelus pilosellus*, *Tribolium castaneum* and *Tribolium confusum*, and 2 other spp. *Dermestes maculatus* and *Necrobia rufipes* commonly associated with dried fish and meat. This suggests severe cross infestation which normally results from poor storage and transporation conditions, and implies serious problems for future processing and storage of the product. In tests cocoyam chips were similar as a food material to other root crops, (yam and cassava) for the development of *A. fasciculatus*, *Dinoderus procellus*, *S. zeamais* and *Tribolium castaneum* but were not as good as cowpea or maize. In the light of increased interest in dried cocoyam products for nonfood applications, the economic significance of insect damage to cocoyams is stressed. BV

Tomatoes

1339

Rodriguez (JH), Cousin (MA) and Nelson (PE). **Thermal resistance and growth of *Bacillus licheniformis* and *Bacillus subtilis* in tomato juice.** *Journal of Food Protection* 56(2); 1993; 165-168

Research was conducted to assess the thermal stability of spores of acid tolerant *Bacillus licheniformis* and *B. subtilis* in tomato juice. D values at 90, 95 and 100°C were 29.5, 15.8 and 5.7 min for *B. subtilis* and 29.9, 12.2 and 5.9 min for *B. licheniformis*, respectively. The z value for *B. subtilis* was 14°C and for *B. licheniformis* 14.2°C. Aerobically, *B. subtilis* spores could germinate and outgrow in tomato juice (pH 4.4) within 4 days at 35°C at inoculum levels as low as 1 spore/ml; *B. licheniformis* spores could only germinate and outgrow if levels were > 10^{-4} spores/ml. Both *Bacillus* spp. could raise the pH of tomato juice to > 4.8 when grown aerobically. Neither *B. licheniformis* nor *B. subtilis* could germinate and outgrow anaerobically in tomato juice (pH 4.4). CSA

FRUITS

Apples

1340

Drake (SR), Eisele (TA) and Waelti (H). **Controlled atmosphere storage of Delicious apples in high and variable carbon dioxide.** *Journal of Food Processing and Preservation* 17(3); 1993; 177-189

Two strains of Delicious apples were held in controlled atm. (CA) storage at various CO_2 levels for 9 months before removal and evaluation. Oxygen in all atmospheres was 1%, and CO_2 levels were 1, 3 or 5% with an additional CO_2 treatment that was increased every 6 wk from 1 to 5% over the storage period. Storage temp. for all treatments was 1°C. Little quality difference was noted for the Delicious apples immediately after storage or after an 8 day ripening period regardless of CO_2 level in storage. Mean values for firmness, external and internal colour, soluble solids content, titratable acidity and amount of scald did not differ between the apples from the different storage treatments. Total carbohydrates and fructose were higher in apples stored at CO_2 levels greater than 1%. Sensory panelists found no flavour differences in apple juice after long term CA storage regardless of CO_2 storage level. AA

Cherries

1341

Amitabh (C) and Nair (MG). **Characterization of pit oil from Montmorency cherry (*Prunus cerasus* L.).** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 879-881

Triolein, 1,2,3-tri-(Z)-9-octadecenoylglycerol, has beeen reported as a constituent of the purified pit oil from Montmorency cherry (*P. cerasus* L.). Clarified kernel oil from Michigan tart cherries, P. cerasus L. var. Montmorency, consisted of a single product 1,3-di[(Z)-9-octadecenoyl]-2-[(Z,Z)-9,12-octadecadienoyl]glycerol (i). Triolein was not present in the Montmorency cherry pit oil in detectable quantities. The structure of (i) was elucidated by chemical and spectral methods and by direct comparison with triolein. The fatty acids present in Montmorency pit oil were identified as oleic (63.6%) and linoleic (31.5%) acids by spectral and GC analyses. Thermal stability of the Montmorency cherry pit oil was also investigated by thermal gravimetric analysis against apricot, canola, vegetable, olive and safflower oils and was found to be higher than or equal to that of all oils studied. Results also indicate that the cherry pit oil may be of use for cooking. BV

Grapes

1342

Elmaci (Y) and Altug (T). **Sugars in grape molasses: a comparison of Lane-Eynon and HPLC method.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 53-54

The HPLC method was found to be more rapid, accurate, and reproducible than the Lane-Eynon method and was able to detect sucrose adulteration. Av. levels of 26.1% fructose, 26.3% glucose and 52.5% total reducing sugars were determined. BV

1343

Morales (M), Pedreno (MA), Munoz (R), Ros (B-A) and Calderon (AA). **Oxidation of flavonols and flavonol glycosides by a hypodermal peroxidase isoenzyme from Gamay Rouge grape (*Vitis vinifera*) berries.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 385-391

Ability of the grapevine hypodermal peroxidase isoenzyme B5 to oxidize the flavonols, quercetin and myricetin, and the flavonol glycosides quercetin-3-arabinoside, quercetin-3-rhamnoside (quercitrin) and myricetin-3-rhamnoside (myricitrin) was studied. Results showed that, whilst the aglycones were good substrates of this peroxidase isoenzyme, their corresponding glycosides were poorly oxidized under the assay conditions. The oxidation of quercetin and myricetin catalysed by the hypodermal peroxidase isoenzyme B5 was strictly dependent on H_2O_2. Kinetic characteristics of the flavonol oxidation were also studied. Whilst the apparent K_m values for quercetin and myricetin were roughly equal (38 and 54μM, respectively), the apparent K_m values for H_2O_2 in each reaction were appreciably different (168 and 8μM, respectively). The optimal pH for quercetin oxidation was 4.0 whereas for myricetin it was 6.0-7.0. Results are discussed in view of the possible involvement of the vacuolar hypodermal β_5 isoperoxidase in the turnover of flavonol and flavonol glycosidises in grapes. AA

Raspberry

1344

Werkhoff (P), Brennecke (S) and Bretschneider (W). **Enantiomeric composition of γ-decalactone in raspberry flavor.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 47-52

Detn. of the enantiomeric composition of γ-decalactone (γ-dl) in raspberry flavour by means of chirospecific multidimensional capillary GC is described, using heart-cutting techniques from DB-WAX as the preseparation column onto Lipodex D [heptakis-(3-O-acetyl-2,6-di-O-pentyl)-β-cyclodextrin] as the chiral stationary phase. The method was used to establish the naturally occurring enantiomeric distribution of γ-dl in raspberry fruits of different origins as well as in raspberry fruit juice concentrates. Chirality evaluation of γ-dl revealed either a significant excess in favour of the (+)-(R)-configurated enantiomer or a racemic distribution. The natural enantiomer composition of γ-dl depends on its concn. in raspberry samples. Higher amounts of γ-dl in raspberry flavour always showed a clear predominance of the (+)-(R)-configured form whilst γ-dl present as minor constituent mainly indicated a nearly racemic mixture. AA

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

1345

Mans (J). **Sweet automation.** *Prepared Foods* 162(1); 1993; 58-61

The new Ambrosia Chocolate plant in Milwaukee, Wisconsin, USA, is described, which combines the latest in-plant computer technology to control its production operations with a computer integration manufacturing system that enables the company to track deliveries, orders and production status. BV

Starch

1346

Jarvis (CE) and Walker (JRL). **Simulataneous, rapid, spectrophotometric determination of total starch, amylose and amylopectin.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 53-57

A novel spectrophotometric method for the simultaneous measurement of total starch, amylose and amylopectin in lipid-free samples was developed using a diode-array spectrophotometer. The method involves measurement of the spectrum of the amylose/amylopectin-iodide complexes at 6 wavelengths and calculation of amylose and amylopectin concn. using multi-component analysis and a spreadsheet computer program. This method appears to offer some advantages to previous 'iodine-blue colour' assays for the measurement of amylose. AA

1347

Ferrero (C), Martino (MN) and Zaritzky (NE). **Stability of frozen starch pastes: effect of freezing, storage and xanthan gum addition.** *Journal of Food Processing and Preservation* 17(3); 1993; 191-211

Starch pastes act as protective systems of the solid elements in precooked frozen foods, minimizing their dehydration and chemical changes during storage. Effect of xanthan gum (0.3% w/w) on corn starch and wheat flour pastes (10% w/w), frozen at different freezing rates and stored between -5 and -20°C, was analysed. Freezing modified the quality attributes of starch pastes increasing exudate production, structure deterioration and rheological changes compared to unfrozen samples. Starch pastes showed a pseudoplastic behaviour and apparent viscosities decreased in frozen samples. High freezing rates led to smaller ice crystals (indirect microscopic observation) and the absence of starch retrogradation. Starch retrogradation and ice recrystallization both contributed to deterioration of the frozen paste during storage (spongy structure, marked decrease of apparent viscosity and increase of syneresis). Addition of xanthan gum minimized spongy structure formation, exudate production and rheological changes; however, no protective effect was observed on ice crystal sizes and on amylopectin retrogradation by DSC. AA

BAKERY PRODUCTS

1348

Radhakrishnan (KL). **Utilization of wheat - innovative bakery products.** *Indian Miller* 24(1); 1993; 90-93

Nutritive value of bakery products (bread, biscuits, crisp bread/flat bread, cakes and confectionery items, doughnuts, puff pastry), their importance in the daily diet and health baked foods are described. SRA

1349

Bhavsar (PC) and Agrawal (BC). **Raw materials and its quality standards for bakery industry.** *Indian Miller* 24(1); 1993; 94-100

Aspects on flour (milling), type of wheat flour composition, quality characteristics (fats and oils, butter oils, milk, salt, water, sugar, yeast, mould inhibitors, baking powder, colours and flavours, eggs) are detailed. SRA

1350

Patel (HG) and Jana (AH). **Dairy ingredients in bakery products - a review.** *Beverage and Food World* 21(3); 1994; 14-19

This review covers aspects on technological properties of milk constituents in relation to baking properties (milk fat, milk proteins (casein, whey proteins), lactose, minerals), milk and milk products for baking industry (milk/skim milk, condensed milk, whole milk powders, non-fat dry milk, cream/dried cream, butter, butteroil/ anhydrous milk fat, fractionated butter fat, fat blends, whey/concentrated whey/whey powder, caseinates, whey protein concentrates, milk proteinates, lactose, lactose hydrolyzed whey products, cheese/cheese powder and yoghurt/yoghurt powders). SRA

1351

Friedman (M). **Grain-based products promote 'well-bred' bodies.** *Prepared Foods* 162(1); 1993; 49

Development of cereal-based products is described. Products covered include: multi-grain breads, cereals and crackers; rice and pasta side dish mixes; whole wheat baking mixes; amaranth grain products (pancake and waffle mix, granolas, crispbreads and snack bars); spelt grain products (organic hot cereals, cinnamon-raisin bread, hot-dog rolls and bagels, dry pasta, pancake and muffin mix); quinoa based products; kamut grain products (cereals, flakes, flour, pasta); products containing teff, a mini-grain which is high in protein, iron and calcium; products containing triticale, a hybrid of rye and wheat; and products containing a combination of grains. BV

1352

Prinyawiwatkul (W), Beuchat (LR) and Resurreccion (AVA). **Optimization of sensory qualities of an extruded snack based on corn starch and peanut flour.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 393-399

The formulation of an extruded snack food based on corn starch and peanut meal, using response surface methodology, was investigated. Consumer preferences for various flavoured and unflavoured snack foods were also determined. Formulations containing 120-200 g/kg non-fermented peanut meal, 0-80 g/kg fermented peanut meal, 300-315 g/kg water and 500 g/kg corn starch were found to be acceptable. Overall product acceptability was enhanced by adding flavourings (nacho cheese, Cheddar cheese and sour cream). The snacks were considered to have a high potential for sale in the marketplace, as judged by consumer evaluation. BV

Biscuits

1353

Rahi (SK). **Indian standards for wheat flour and biscuit industries.** *Indian Miller* 24(1); 1993; 101-104

Certification marks scheme, hygienic conditions (site and building maintenance, store room), factory and processing hygiene (equipment and container cleanliness, water, employee hygiene), packaging material (wax-coated paper, polyethylene films), testing (sensory and physico-chemical testing procedures), marketing and sampling according to Indian Standards are covered. SRA

Bread

1354

Bhavsar (PC) and Agrawal (BC). **Quality problems in bread and its remedies.** *Indian Miller* 24(1); 1993; 115-119

Some of the defects, spoilage problems in bread and remedial measure are discussed. Aspects covered are defects in crust colour, grain, symmetry, break and shred, texture, poor taste, aroma and spoilage. SRA

1355

Amarjeet (K), Bhupendar (S) and Sidhu (JS). **Studies on bread and durum wheat blends.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 35-40

Bread wheat (BW) and durum wheat (DW) grains blended in different proportions (100:0, 80:20, 60:40, 40:60, 20:80, 0:100) were milled into flour and *atta* (Indian whole meal flour) for use in bread, cookie and chapati making. An increase in protein, ash, reducing sugars, non-reducing sugars and free fatty acids and a decrease in starch content with increasing proportion of DW in the flour blends was noticed. Fat contents increased with increasing proportion of DW in the unmilled blends but decreased in flour blends. Diastatic activity, damaged starch, and farinograph water absorption increased whereas stability of dough decreased with increase of durum flour in the blend. Good quality bread and cookies could be prepared with wheat and durum flour blend in 60:40 ratio. Acceptable chapati could be prepared from *atta* or flour obtained from 40% *bread wheat* and 60% durum wheat. BV

1356

Faid (M), Boraam (F), Achbab (A) and Larpent (JP). **Yeast-lactic acid bacteria interactions in Moroccan sour-dough bread fermentation.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 443-446

The interactions of lactic acid bacteria (LAB) and yeasts in pure cultures for sourdough fermentation was studied; growth patterns of both microorganisms were determined during fermentation. Physicochemical properties of the dough, including pH drop, titratable acidity increase and dough rising capacity, were also assessed. The mixed cultures contained *Candida milleri*, *Saccharomyces cerevisiae*, *Lactobacillus plantarum* and *L. brevis*. Cultures were used in 4 combinations in wheat flour dough fermentation (each LAB sp. with each yeast sp.). Results showed that *L. plantarum* was as active as *L. brevis* in acidification of the dough. Dough made with *Sacch. cerevisiae* and *L. plantarum* leavened the best; dough rising capacity was high. When *Sacch. cerevisiae* was combined with *L. brevis*, a net decrease in the dough rising capacity was observed; acidification, however, was comparable. *Sacch. cerevisiae* was more resistant to the effects of the LAB than *C. milleri*. Combinations of *L. plantarum* with either *C. milleri* or *Sacch. cerevisiae* gave the best overall results. BV

MILK AND DAIRY PRODUCTS

1357

Criado (M-T), Saurez (B) and Ferreiros (CM). **The importance of bacterial adhesion in the dairy industry.** *Food Technology* 48(2); 1994; 123-126

Befouling of dairy equipment causes serious sanitation and economic problems as well as decreases the effectiveness of biocidal treatments. Aspects covered are bacteria and surface interactions, preventing microbial contamination, adhesion in the dairy industry and evaluation of bacterial adhesion. CSA

1358

Moineau (S), Pandian (S) and Klaenhammer (TR). **Restriction/modification systems and restriction endonucleases are more effective on lactococcal bacteriophages that have emerged recently in the dairy industry.** *Applied and Environmental Microbiology* 59(1); 1993; 197-202

Recently, 8 lytic small isometric-headed bacteriophages were isolated from cheese-manufacturing plants throughout North America. The 8 phages were different, but all propagated on 1 strain, *Lactococcus lactis* NCK203. On the basis of DNA homology, they were classified in the P335 species. Digestion of their genomes in vitro with restriction enzymes resulted in an unusually high number of type II endonuclease sites compared with the more common lytic phages of the 936 (small isometric-headed) and c2 (prolate-headed) species. In vivo, the P335 phages were more sensitive to 4 distinct lactococcal restriction and modification (R/M) systems than phages belonging to the 936 and c2 species. A significant correlation was found between the number of restriction sites for endonucleases (purified from other bacterial genera) and the relative susceptibility of phages to lactococcal R/M systems. Comparisons among these 3 phage species indicate that the P335 species may have emerged most recently in the dairy industry. AA

Milk

1359

Rashda Ali and Syed Asad Sayeed. **Effect of aflatoxin - contaminated feeds on buffalo milk.** *Indian Food Industry* 12(2); 1993; 38-40

The study deals with the detection and estimation of aflatoxin B_1 in feed, composed of cottonseed, decayed bread and husk. Its presence in buffalo milk consuming the contaminated feed indicated the adverse effects of aflatoxins in food chain. CSA

1360

Freitas (AC), Nunes (MP), Milhomem (AM) and Ricciardi (ID). **Occurrence and characterization of *Aeromonas* species in pasteurized milk and White cheese in Rio de Janeiro, Brazil.** *Journal of Food Protection* 56(1); 1993; 62-65

A total of 35 samples (1000 ml each) of pasteurized milk and 25 samples (100 g each) of White cheese purchased at supermarkets in Rio de Janeiro were analysed for the presence of *Aeromonas*. Strains of *Aeromonas* were isolated from 28.5% of pasteurized milk and 32% of White cheese samples. Standard plate counts in the pasteurized milk samples ranged from 7.2×10^4 to 2.5×10^5 cfu/ml. Total and faecal coliform counts in White cheese samples ranged from 1.9×10^4 to 2.4×10^5 MPN/g and 3.2×10^2 to 1.2×10^5 MPN/g, respectively. *A. caviae* (58.9%), *A. hydrophila* (12.8%) and *A. schubertii* (2.5%) were identified among cultures isolated from pasteurized milk samples. 25% of the strains could be classified only as *Aeromonas* spp. In White cheese samples, unclassified strains were the most frequent isolates (61.5%) followed by *A. hydrophila* (26.9%), *A. caviae* (7.6%) and *A. sobria* (3.8%). Only strains of *A. hydrophila* and *A. sobria* showed high rate of positive results when tested for the production of haemolysin, cytotoxin and staphylolytic activity. Heat-stable enterotoxin and autoagglutination tests did not correlate as virulence factors. The presence of *Aeromonas* sp. in refrigerated food samples suggested that this microorganism could be a potential foodborne pathogen, and dairy products may represent an important vehicle of its transmission. AA

1361

Mosteller (TM) and Bishop (JR). **Sanitizer efficacy against attached bacteria in a milk biofilm.** *Journal of Food Protection* 56(1); 1993; 34-41

The objectives of this study were to evaluate efficacy of in-use concn. of sanitizers on bacteria attached to gaskets in dairies; compare bacterial attachment to rubber vs. Teflon gaskets; examine different methods of bacterial enumeration; and compare sanitizer efficacy on attached and suspended bacteria. Results indicated that iodophore, hypochlorite, acid anionic, peroxyacetic acid, fatty acid and quaternary ammonium sanitizers failed to provide adequate reduction in numbers of attached bacteria at levels of 10^4, $10^5/mm^2$. The test organisms (*Pseudomonas fluorescens, Yersinia enterocolitica* and *Listeria monocytogenes*) attached in slightly higher numbers to the rubber than the Teflon surfaces. Impedance microbiology permitted the estimation of both reversibly and irreversibly attached bacteria and was thus preferred to other enumeration methods tested, i.e., plate counts or the direct epifluorescent filter technique. Sanitizers were more effective against bacterial suspensions than against attached bacteria. On a Teflon surface, the iodophor, hypochlorite and fatty acid sanitizers provided > 3 log cycles or 99.9% reduction in numbers of *Y. enterocolitica*. Hypochlorite resulted in > 3 log/cycle reduction in numbers of *P. fluorescens* on both rubber and Teflon surfaces. CSA

Milk products

1362

Patel (AA) and Gupta (SK). **A new butter-flavoured low-fat spread.** *Indian Food Industry* 12(1); 1993; 28-31

The newly developed low-fat spread based on vegetable fat, soy concentrate and skim milk besides other minor ingredients which is a potentially valuable low-cost substitute for expensive table butter is described in this article. It offers more specific advantages from dietary and convenience points of view as it is free from cholesterol and low in saturated fat and has a remarkably improved spreadability. CSA

1363

Hatchwell (LC). **Overcoming flavour challenges in low-fat frozen desserts.** *Food Technology* 48(2); 1994; 98-100, 102

Aspects delt in this article are the basics of flavour, functional aspects of fat reduction, formulation of reduced-fat ice cream based on raw material quality, base characteristics, flavour systems, mouthfeeel flavours, fat flavours, dairy flavours, brown notes and flavour potentiators. Practical examples of vanilla and chocolate ice creams as flavour challenges in reduced-fat dairy systems are also presented. CSA

Cheese

Cheddar cheese

1364

Anjan Reddy (K) and Marth (EH). **Proteolysis in Cheddar cheese made with sodium chloride, potassium chloride or mixtures of sodium and potassium chloride.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 434-442

Proteolysis in salt-free Cheddar cheese and in Cheddar cheese prepared with NaCl, KCl or mixtures of both (2:1, 1:1, 1:2 and 3:4, wt. basis) was determined; and final salt concn. of 15.0 or 17.5 g/kg were achieved. Cheeses were ripened at 3 plus/minus 1°C and proteolysis was determined over a 36 wk period. During the ripening period, peptide material soluble in trichloroacetic acid (TCA), and free amino acids, measured as phosphotungstic acid (PTA)-soluble amino N, increased in all cheeses. After 12, 24 and 36 wk of ripening, no significant differences in levels of TCA-soluble N and PTA-soluble amino N attributed to the salt treatments were determined. More proteolysis was found to occur in unsalted cheeses. Cheeses were also made with either mixtures of *Lactococcus lactis* subsp. *lactis* and *L. lactis* subsp. *cremoris* (trial 1) or just *L. lactis* subsp. *lactis* alone (trial 2). Peptide extracts from cheeses of both trials were chromatographed using a Sephadex G-25 column. Sensory analysis revealed that only eluent fractions of cheese from trial 1 were slightly to markedly bitter. In trial 2, cheeses made with NaCl or NaCl/KCl mixtures were not bitter; however, fractions from unsalted cheeses were slightly bitter. Results indicate that KCl was not responsible for the bitterness found in cheeses from trial 1. BV

Feta cheese

1365

Papadopoulou (C), Maipa (V), Dimitriou (D), Pappas (C), Voutsinas (L), Malatou (H). **Behavior of *Salmonella enteritidis* during the manufacture, ripening, and storage of**

Feta cheese made from unpasteurized ewe's milk. *Journal of Food Protection* 56(1); 1993; 25-28

The ability of *Salmonella enteritidis* to grow during Feta cheesemaking and to survive during ripening and storage of the cheese was investigated. Unpasteurized whole ewes' milk was inoculated to contain 10^6 - 10^7 cfu/ml of *S. enteritidis* and was processed into Feta cheese following standard procedures. All samples were examined for *S. enteritidis* both quantitatively and qualitatively, while moisture, fat, a_w and pH values were also measured. *S. enteritidis* was enumerated in duplicate samples by surface plating on SS agar. Selected *Salmonella* colonies were identified biochemically and serologically. Enumerations showed that *S. enteritidis* was entrapped in curd with the population increasing to a max. during the first 48 h. Thereafter, growth of *S. enteritidis* was inhibited and surviving cells persisted in the curd for up to 20 days. AA

Goat's cheese

1366

Garrido (MP), Quintana (MA) and Barneto (R). **Microbiological and physico-chemical study of goat's cheese.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 11-13

Idiazabal cheese

1367

Perez (E-FJ), Albisu (M), Barron (LJR) and Barcina (Y). **Microbiological changes with brining time and smoking during the ripening of Idiazabal cheese.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 14-20

The effects of brining time (12, 24 or 36 h) and smoking on microbial growth during ripening of Idiazabal ewes' milk cheese for < 180 days were investigated. The microbial groups studied (including various bacterial groups, yeasts and moulds) showed differing growth trends, although, on the whole, counts tended to stabilize towards the end of ripening. Linear and non-linear regression analyses were applied to microorganism growth during cheese ripening. Analysis of variance and Student's t-test revealed significant differences during ripening between cheeses with different brining times and between smoked and unsmoked cheeses. This demonstrates the importance of these 2 processing steps for the final characteristics of Idiazabal cheese. BV

MEAT AND POULTRY

Meat

1368

Berwaj (JS) and Dinchev (D). **Microbial starter cultures for raw ripened meat products.** *Indian Food Industry* 12(6); 1993; 23-25

Traditional processing of raw ripened meat products involves naturally selected microorganisms existing in green rooms for ripening of the products. The natural course of ripening, however does not guarantee against the occurrence of defects in the product or against the microorganisms which cause food poisoning and spoilage. For regulating the microbiological processes to ensure products with stable colour, flavour and consistency and also hasten the production process, certain microbial starter culture preparations are used. The microorganisms mainly used as starter cultures are the strains of lactobacilli, micrococci, yeast and moulds. The method of preparation of the starter culture is also discussed in the article. CSA

1369

Sieber (R). **Cholesterol removal from animal food - can it be justified?.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 375-387

Reviews the methods for reduction of cholesterol in commonly eaten animal foods, which have been developed successfully over the past few yr with the aim of lowering dietary cholesterol. Aspects discussed include: cholesterol removal from foods; processes for cholesterol removal from foods (biological processes, physical processes (distillation and crystallization methods, supercritical fluid extraction), chemical processes (solid-liquid extraction, complex formation)); cholesterol removal from different foods (eggs, fish, meat, milk and dairy products); cholesterol-reduced foods (a perspective); and effects of cholesterol in humans (influence of dietary cholesterol on serum cholesterol, further arguements against cholesterol removal from animal food). 181 references. BV

1370

Kavas (A) and Karakaya (S). **Effect of microwave and conventional cooking on nutritive value of semitendinosus muscle.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 30-34

The effects of cooking in a microwave (MO) or conventional oven (CO) on nutritive value and sensory properties of beef semitendinosus muscle (SM) was studied. Beef slices were either cooked for 14 min in a 2450 MHz 980 W MO or for 35 min at 170°C in an electric oven. Moisture, protein, riboflavin, niacin, pyridoxine, iron, Ca, and energy contents of SM cooked in the MO were higher than those of the meat cooked in electrical oven whereas fat content was lower. No significant differences were found between the 2 cooking methods for flavour and texture characteristics, although panellists preferred the appearance of the conventionally cooked samples. BV

Beef

1371

Kalchayanand (N), Ray (B) and Field (RA). **Characteristics of psychrotrophic *Clostridium laramie* causing spoilage of vacuum-packaged refrigerated fresh and roasted beef.** *Journal of Food Protection* 56(1); 1993; 13-17

A *Clostridium* sp., associated with an unusual spoilage of vacuum-packaged refrigerated uncooked (fresh) and roasted beef, was isolated as a pure culture from spores in spoiled beef. The pure culture was used to study important characteristics and to differentiate it from other clostridial spp. usually found in beef. The biochemical properties, volatile fatty acid and soluble-protein profiles, temp. and pHs of growth, and temp. of sporulation, germination and destruction of the isolate were distinctly different from other *Clostridium* spp. studied. It is not toxigenic and has 26% guanine plus cytosine. The isolate is a new sp. and is named *C. laramie*. AA

1372

Narasimhan (R), Rubin (LJ) and Diosady (LL). **Studies on meat flavor. IV. Fractionation, characterization, and quantitation of volatiles from uncured and cured beef and chicken.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 939-945

Volatile compounds from uncured and cured beef and chicken were trapped onto a solid adsorbent (Florisil cartridge) and in an organic solvent (pentane) using the nitrogen purge-and-trap (NPT) technique. 12 new compounds were identified. The newly identified compounds 4-ethyl-1-methylhexane, 1,1,3- trimethylcyclohexane, α-pinene, 4-ethyl-1,2- dimethylbenzene and 3,6-dimethylundecane were unique to beef. 7 components were identified in chicken but not in pork or beef. These included 1,2- dibutyl cyclopentane, 2,6-bis (1,1- dimethylethyl)-4-methylphenol and 1,12-dodecanediol. BV

Products

Frankfurters

1373

Lecomte (NB) and Zayas (JF). **Properties of batters and storage stability of frankfurters containing preemulsified fat stabilized with soy proteins.** *Journal of Food Processing and Preservation* 17(4); 1993; 287-304

Soy proteins (SPs) were incorporated into meat batters either as part of preemulsified fat (PEF) or as a powder. Batters made with PEF had higher viscosity, water holding capacity, adhesive properties and improved batter stability. During storage, experimental frankfurters had similar microbial counts, aw and TBA values; frankfurters containing SPs added as PEF had lower total volatile nitrogen than those samples with sp added as a powder. Samples containing PEF during 30 days of storage were less bitter and beany than those with powdered proteins. Incorporation of SP in the PEF form improved functionality of sausage batters, and therefore, could increase the usage of SPs in comminuted meats. AA

Ham

1374

Buscailhon (S), Berdague (JL) and Monin (G). **Time-related changes in volatile compounds of lean tissue during processing of French dry-cured ham.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 69-75

Poultry

1375

Anon. **Salmonella treatment minimizes liabilities.** *Prepared Foods* 162 (2); 1993; 65

Use of Avgard trisodium phosphate (TSP), developed by Rhone-Poulenc Food Ingredients, New Jersey, USA, to significantly reduce, although not eliminate, the incidence of salmonellae and other foodborne pathogens on poultry is discussed. The TSP does not affect spoilage bacteria and, consequently, they can still behave as markers of poultry freshness. Treatment involves immersing the poultry for a few seconds in a solution of TSP near the end of the production operation. A separate dipping tank made of stainless steel is required as the solution will corrode aluminium tanks. Results indicate that no difference in taste, appearance and texture between treated and untreated chickens, in either raw, baked or fried form. BV

Chickens

Broilers

1376

Mahapatra (CM). **Further - processing of broilers.** *Indian Food Industry* 12(1); 1993; 32-33

Describes the rapid growth of fast-food industries with the demand for further processed poultry products for reasons of popularity, availablity and preference and the technologies available for further processing of poultry. CSA

Products

Eggs

1377

Crone (AVJ), Hand (MV), Hamilton (JTG), Sharma (ND), Boyd (DR), Stevenson (MH). **Synthesis, characterisation and use of 2-tetradecylcyclobutanone together with other cyclobutanones as markers for irradiated liquid whole egg.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 361-367

Synthesis and characterization of 2-tetradecylcyclobutanone (TCB) [the proposed product of irradiated stearic acid] are described [as a marker for irradiated liquid whole egg.] Both 2-dodecylcyclobutanone and TCB were shown to be present in liquid whole egg irradiated at doses of 2.5 and 10.0 kGy. These compounds were absent from unirradiated pasteurized samples. Using GC and spectroscopy, there was also evidence for the presence in irradiated egg of 2-tetradecenyl- and 2-tetradecadienylcyclobutanone which are formed from oleic and linoleic acids, respectively. Authentic standards for these unsaturated cyclobutanones were not available commercially but the presence of 2-tetradecenylcyclobutanone was substantiated by hydrogenating the egg extracts, so converting this unsaturated cyclobutanone to TCB. Saturated and unsaturated cyclobutanones appear to be specific products of irradiation and are potential markers for detection of irradiated liquid egg and probably other fat-containing foods. AA

SEAFOODS

1378

Devarajan (S). **An economic analysis of marine product export from India.** *Madras Agricultural Journal* 80(1); 1993; 23-27

Trend lines were fitted to predict the growth rate for marine product from India to other countries. Total marine product export increased at 8.55% and the value by 22.56%. Share of shrimp to total marine product export increased from 54.0% in 1960 to 58.41% in 1986. While the value increased from 70.22 to 82.12% for the above period indicating the prawn forms major share. Market share analysis revealed that Japan and U.S.A. are the 2 major importers of marine products accounting for 44.85 and 12.96% while the value by 67.62 and 12.48% respectively. Since the prawn forms major share in marine product export, it is necessary to revitalise the industry by providing liberalised credit to processors to introduce new technologies by sophisticated machineries offering tax concessions to traders and arranging participation in the world fairs. AA

1379

Jose (VT) and Sherief (PM). **Glaze hardener - a new recruit to Indian seafood processing machinery.** *Seafood Export Journal* 25(9); 1993; 7, 9-10

Glaze hardener is a 'mini freezer' and operates at a temp. of -25°C or below. The product immediately after glazing is fed into this machine and this causes the temp. of the product to go below -20°C before packing. Since there is no slow freezing during cold storage, it forms a hard and uniform glaze around the product with min. clumping. Uniform thickness of glaze also reduces dehydration. The use of glaze harder reduces drip loss, prevents dehydration and quality deterioration. Investment on machinery can be realised within 3 yr. AA

1380

Gupta (SS) and Chakrabarti (R). **Production of salted and pressed *Decapterus* sp. and its storage characteristics.** *Fishery Technology* 31(2); 1994; 181-184

Optimum curing time, optimum pressure and proper concn. of propionic acid were standardised to prepare salted and pressed *Decapterus* with longer storage life. Dressed fish is immersed in saturated NaCl brine for 7 days followed by pressing in a wooden box under 0.064 kg cm^{-2} pressure for 15 h, packed in 200 guage polythene bags and stored well for one month. Addition of 0.1 and 0.2% propionic acid to the curing brine prevented the growth of red halophiles, moulds and increased the shelf-life of the pressed product to 45 and 60 days respectively. SRA

1381

Prasad (MM) and Panduranga Rao (CC). **Pathogenic vibrios associated with seafoods in and around Kakinada, India.** *Fishery Technology* 31(2); 1994; 185-187

Prevalence of pathogenic vibrios was analysed in 85 fresh, 10 frozen and 4 iced prawn (*Penaeus indicus*), 10 fresh, 20 frozen fish samples collected from local market. 30% of *P. indicus* contained vibrios comprising *V. parahaemolyticus*, *V. vulnificus*, *V. metchnikovii*, *V. cholerae* Non 01, *V. anguillarum* and group *F. vibrios*. Incidence of pathogenic vibrios were lower in fish compared to prawn. SRA

1382

Gildberg (A). **Enzymic processing of marine raw materials.** *Process Biochemistry* 28(1); 1993; 1-15

Processing and modification of marine raw materials (fish, shellfish and algae) by enzymes is reviewed under the following headings: fish sauce and fish silage; protein hydrolysates; ripening by enzyme addition; selective tissue degradation; and miscellaneous methods. It is concluded that present use of enzymes in processing of marine raw materials is limited; herring maturation and fish sauce production are the most important current uses. However, the potential utility of enzymes in the field is considerable. Enzyme use for the production of fish protein hydrolysates is increasing, and selective enzymic hydrolysis as an alternative to mechanical separation may be worthy of development. 130 references. BV

Fish

1383

Ravindranathan Nair (P), Unnikrishnan Nair (TS), Mathen (C) and George Joseph (K). **Thermal treatment for the prevention of insect infestation in dried fish - Use of a**

tunnel drier/solar tent drier. *Fishery Technology* 31(2); 1994; 133-141

Thermal treatment carried out in a tunnel drier/solar tent drier maintained between 55-65°C showed that optimum time of exposure for thin var. of dry fish was 60 min and 90 min for thick fish. Thermally treated products were cooled and packed in polythene bags. Heat treated samples remained insect free for 4 months, refined and preservative treated samples for more than 6 months and untreated samples for only 1-2 months. SRA

1384

Vijayan (PK), Joseph (J) and Gopakumar (K). **Formation of histamine in flying fish (*Hirundichthys coramandelensis*) at ambient temperature and in ice.** *Fishery Technology* 31(2); 1994; 142-147

Sensory qualities, histamine formation in flying fish (*H. coramandelensis*) at ambient temp. (30 plus or minus 2°C) and in ice were studied along with other non-protein components. Initial samples at 0 h did not contain any histamine. In the early stages of storage upto 9 h the histamine production was negligible (3.52 mg/100 g^{-1}), by 13 h reached higher than acceptable level of 55.53 mg/100 g^{-1} and it was rapid on further storage at ambient temp. During iced storage histamine formation was negligible, reaching only 0.22 mg/100 g^{-1} by 17 days of storage. A positive relation was noticed between histamine content and TMAN-TVBN content and sensory qualities. SRA

1385

Antony (KP), Srinivas Gopal (TK), Thankamma (R) and Prabhu (PV). **Effect of packaging materials on the shelf-life of frozen fish fingers.** *Fishery Technology* 31(2); 1994; 148-152

Commercially available lean fish, *Sciaena aneus*, was used for making battered and breaded fish fingers. Fish fingers were packed in flexible film pouches of 50 μ LDPE, 62.5 μ LDPE - HDPE (LD/HDPE), 20 NU High mol. wt. HDPE (HM-HDPE) and 100 μ LDPE - Nylon-Primacore (LDPE/NY/PC), heat sealed and stored at -20°C. Quality evaluation showed that control sample (kept without packaging) were discarded in 4 wk time due to rancidity development, tough texture and colour changes; and samples packed in LD/HDPE and LDPE/NY/PC remained in satisfactory condition up to 28 and 32 wk respectively, whereas LDPE and HM-HDPE packed samples only for 20 wk. AA

1386

Prasad (MM) and Panduranga Rao (CC). **Storage studies on commercial salt cured dry fish with special reference to red discolouration.** *Fishery Technology* 31(2); 1994; 163-166

Quality of 80 samples of commercial salt cured dry fish belonging to 23 sp. groups from Kakinada, S. India, stored in polyethylene bags at ambient temp. (37°C) was monitored up to the point of spoilage. Spoilages were red discolouration (55%), rancidity (38.75%) and fungal contamination (6.25%). Among those showing red discolouration 97.7% of the samples were affected within 2 months of storage, and contained very high levels of total volatile nitrogen and total red halophilic counts. SRA

1387

Davis (L), Goodwin (L), Smith (G) and Hole (M). **Lipid oxidation in salted-dried fish: the effect of temperature and light on the rate of oxidation of a fish oil.** *Journal of the Science of Food and Agriculture* 62 (4); 1993; 355-359

In relation to studies of lipid oxidation during the processing and storage of salted sun-dried fish, the measurement of the initial rate of oxygen uptake was studied on a model system consisting of a highly polyunsaturated fish oil. This parameter was used for assessing effects of temp. and light conditions on the model system and was compared to changes in peroxide value and polyene index. Assessment of oxygen uptake using a Gilson respirometer was found to give a clearer indication than other methods of assessment of effect of different conditions on fish oil oxidation. At 30°C, the initial rate of oxygen uptake increased from 0.103 mul O_2 g^{-1} min^{-1} to 0.158 μl O_2 g^{-1} min^{-1} with a change in light conditions from dark to photosynthesis light. At 40°C, rate of oxygen uptake was faster than at 30°C, and effect of light was more pronounced, giving values of 0.188 μl O_2 g$_{-1}$ min $^{-1}$ and 0.483 μl O2 g$_{-1}$ min$_{-1}$, for dark and photosynthesis light respectively. Results for measurement of the initial rate of oxygen uptake suggest its use as a sensitive and reliable method for investigation of the contribution of the many components in salted sun-dried fish towards the rate of oxidation and subsequent rancidity. AA

Bombay duck

1388

Vihn (PQ), Rao (VS), Adhikari (HR) and Nair (PM). **Effect of γ-irradiation on the fatty acid composition of salted, semi-dried Vietnamese scad and Bombay duck.** *Fishery Technology* 31(2); 1994; 154-158

Use of irradiation of 3 kGy to preserve semi-dried Vietnamese scad (SDVS) (*Alepes mate*) and Bombay duck (BD) (*Horpodon nehereus*) does not affect the total lipid content, fatty acid profile in general, except for the reduction in $C_{22:6}$ content of Vietnamese scad and n-3 poly unsaturated fatty acid (PUFA) content. Irradiated SDVS and BD could still form a good source of 2 n-3 PUFA ($C_{20:5}$ and $C_{22:6}$), useful for their therapeutic value in the prevention and treatment of cardiovascular disease. SRA

Crawfish

1389

Dorsa (WJ), Marshall (DL) and Semien (M). **Effect of potassium sorbate and citric acid sprays on growth of *Listeria monocytogenes* on cooked crawfish (*Procambarus clarkii*) tail meat at 4°C.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 480-482

Effects of citric acid (CA, 0.03 g/kg) on the growth of *L. monocytogenes* on crawfish (CF) was not significantly different from that on untreated samples. The lag phase of the bacterium was extended by 2 days when the crawfish was treated with 0.03 g/kg potassium sorbate (PS). Once exponential growth of the bacterium began, a generation time of 28.1 h was observed; this value was not significantly different from that of untreated CF. It is concluded that post processing spray application of 0.03 g/kg of PS or CA to CF has little effect in adding any degree of safety against *L. monocytogenes*. BV

Rockfish

1390

Wiseso-Marseno (D), Hori (K) and Miyazawa (K). **Purification and properties of membrane-bound 5'-nucleotidase from black rockfish (*Sebastes inermis*) muscle.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 863-869

A membrane-bound 5'-nucleotidase from black rockfish, *S. inermis*, white muscle was purified to homogeneity using Triton X-100 for the solubilization and 2 steps of affinity chromatography on ConA and 5'-AMP Sepharose. The enzyme is a glycoprotein, and its active site contains a serine residue. The subunit and native mol. wt. are 67 000 and 265 000, respectively. Optimal pH and temp. using IMP as substrate were 8.3 and 45°C, respectively. The enzyme hydrolysed all nucleoside 5'-monophosphates tested [5'-AMP, 5'-IMP, 5'-GMP, 5'-UMP and 5'CMP] but not other phosphate esters examined [2'(3')-AMP, 2'(3')-GMP, p-nitrophenyl phosphate and sodium beta-glycerophosphate]. The V_{max}/K_m values indicated that, of the substrates tested, the enzyme had greatest affinity for AMP. It was inhibited by phenylmethanesulphonylfluoride, diisopropyl fluorophosphate, ATP, ADP, adenosine, *o*-phenanthroline and EDTA. EDTA inhibition was counteracted by addition of divalent cations. It was inhibited by BHA, at millimolar range, but not by BHT. AA

Products

Fish

1391

Dhanpal (K), Rathnakumar (K), Indra Jasmine (G) and Jeyachandran (P). **Processing chank meat (*Xancus pyrum*) into pickles.** *Fishery Technology* 31(2); 1994; 188-190

Fresh chank (*X. pyrum*) meat collected from Tuticorin, India were cleaned, blanched, drained, chilled by ice, cut into small pieces and dried. Pickles were prepared by adding 10% ginger, 10% garlic, 0.7% green chilli, 0.25% cumin seed, 0.25% mustard seed, 0.15% asafoetida, 0.1% fenugreek, 0.7% chilli powder, 0.1% curry masala, 10% salt, 40% refined oil, 1% curry leaves, 30% vinegar, 0.5% citric acid, 0.5% sodium benzoate. They were packed in glass bottles, and stored for different storage time (30, 60, 120, 150 and 180 days) at ambient temp. Biochemical, microbiological and sensory analysis showed that the product remained in good condition for 180 days at ambient temp. SRA

1392

Ohshima (T), Nan (LI) and Koizumi (C). **Oxidative decomposition of cholesterol in fish products.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 595-600

Cholesterol oxides (CO) in fish products popular in Japan, including salted-dried, boiled-dried and smoked products, were qualitatively and quantitatively determined as trimethylsilyl ether derivatives by GLC and MS. The level of total CO ranged widely between 8.3 p.p.m. in boiled-dried shrimp and 188.0 p.p.m. in boiled-dried anchovy. 7β-Hydroxycholesterol and 7-ketocholesterol were the most prominent oxidative decomposition products of cholesterol. The levels of epimeric epoxides, cholestane triol and 25-hydroxycholesterol were relatively low. To elucidate a mechanism of cholesterol oxidation during fish processing and subsequent preservation, 4 model systems, consisting of a mixture of purified cod liver triglycerides plus cholesterol, of a mixture of authentic triolein plus cholesterol, of triolein alone and of cholesterol alone, were stored separately at 25°C in dry air for up to 104 days. Residual fatty acids of the triglycerides and the CO produced were recovered and determined. O_2 uptake remained almost unchanged for the mixture of triolein plus cholesterol. No detectable amount of CO was produced and the residual oleic acid content, measured by an internal standard, remained almost unchanged. For the mixture of cod liver triglycerides plus cholesterol, a significant increase in O_2 uptake was observed. A continuous increase in the amount of CO was observed, accompanied by a significant concurrent decrease in polyunsaturated fatty acid residues, as well as of the oleic acid naturally present. Results of the study suggest that cholesterol oxidation in fish products proceeds in conjunction with oxidative decomposition of the coexisting polyunsaturated fatty acids of fish oils. AA

1393

Staby (A) and Mollerup (J). **Solubility of fish oil fatty acid ethyl esters in sub- and supercritical carbon dioxide.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 583-588

Mutual solubilities and K-values of fish oil fatty acid ethyl esters, prepared from sand eel [*Ammodytes lancea*] oil, and sub- and supercritical carbon dioxide were measured in an apparatus originally designed for phase equilibrium, density and gas-oil ratio measurements of reservoir fluids. Measurements were performed at pressures from 2 to 22 MPa at temp. of 283.2, 313.2 and 343.2°K. Experimental temp., pressures, solubilities, K-values and densities are reported. K-values of ethyl myristate, palmitate, oleate, eicosapentaenoate and docosahexaenoate are compared with published experimental binary and/or multicomponent data. Because both vapour and liquid solubilities are reported, such data are applicable in the design of supercritical extraction plants. AA

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

1394

Demuyakor (B) and Ohta (Y). **Characteristics of single and mixed culture fermentation of**

pito beer. *Journal of the Science of Food and Agriculture* 62(4); 1993; 401-408

The fermentation of pito, (a traditional alcoholic beverage from west Africa), was undertaken using selected yeast strains of a crude mixed yeast culture collected from traditional breweries and 2 types of sorghum malt. Fermentation characteristics and product quality of the pure and mixed fermentations were monitored and compared. Significant differences were observed between the mixed culture fermentation and the single culture fermentations. Acid production of the mixed culture fermentations was higher whereas ethanol production and sugar utilization were lower than those of the pure strain fermentations. Sensory observations and analysis of volatile compounds also indicated differences in the fermentations. Use of pure cultures in fermentations proved to yield more ethanol. Sorghum var. was also observed to have an influence on the fermentation pattern. Utilization of nutrients from the white sorghum malt extract was greater and faster than those from the red sorghum. AA

Wines

1395

Herraiz (T) and Ough (CS). **Chemical and technological factors determining tetrahydro-beta-carboline-3-carboxylic acid content in fermented alcoholic beverages.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 959-964

Formation of tetrahydro-β- carboline-3-carboxylic acid in fermented alcoholic beverages were studied in model solutions and during alcoholic fermentation of grape juices. 1S,3S and 1R,3S diastereoisomers of 1-methyl-1,2,3,4- tetrahydro-β- carboline-3-carboxylic acid (MTCA) were formed from tryptophan when acetaldehyde was released by yeast during growth and alcoholic fermentation. Low pH [< 4] and high temp. [80°C] of storage accelerated the reaction between tryptophan and acetaldehyde to give MTCA. SO_2 reacted with both acetaldehyde and tryptophan, restricting the amount of MTCA formed, during alcoholic fermentation and storage. L-Tryptophan and acetaldehyde available for the reactions determined the level of tetrahydro-β-carboline-3-carboxylic acids in wines. Yeast absorbed tryptophan rapidly in the 1st days of fermentation, minimizing formation of tetrahydro-β-carboline-3-COOH. The reaction rate to form 1,2,3,4-tetrahydro-β-carboline-3-COOH (THCA) after reaction of tryptophan with formaldehyde was much faster than for MTCA. THCA may also be formed at the high storage temp. BV

1396

Akinyanju (JA) and Oyedeji (BM). **Comparative study of mixed flora and single strain fermentation in the production of plantain (*Musa paradisiaca*) wine.** *Chemie Mikrobiologie Technologie der Lebensmittel* 15(1/2); 1993; 21-24

Simulation of traditional production of a Nigerian wine from over-ripe plantain indicated that a mixed population of yeasts and bacteria was present in the fermenting must. Amount of alcohol produced by this mixed flora was about 2% after 96 h. The wine had a strong sweetish aroma with a high titratable acidity and was regarded as acceptable by a sensory panel. Fermentation of the over-ripe plantain with individual pure cultures of 3 yeast isolates obtained from the naturally fermenting must, (*Saccharomyces carlsbergensis*, *S. cerevisiae* and *Torulopsis* sp.) resulted in wine with higher alcohol content (2.5-4.5%) with the *Saccharomyces* spp. and lower alcohol content (1.5%) with the *Torulopsis* sp. Wine from these single strain fermentations had a different aroma to that obtained from mixed flora fermentation and was not regarded as acceptable in sensory tests. The relationship between changes in pH and titratable acidity differed for the individual fermenting microflora, suggesting different levels of organic acid production. AA

Non-alcoholic beverages

Fruit juices

Cashew apple juices

1397

Kubo (I), Ochi (M), Vieira (PC) and Komatsu (S). **Antitumor agents from the cashew**

(Anacardium occidentale) apple juice. *Journal of Agricultural and Food Chemistry* 41(6); 1993; 1012-1015

Three anacardic acids were isolated as cytotoxic agents against BT-20 breast carcinoma cells from cashew apple juice. In addition to these anacardic acids, cytotoxicity of their 13 congeners isolated from the cashew nut and nut shell oil was examined. Anacardic acids, cardols and methylcardols were found to exhibit moderate cytotoxic activity against both BT-20 breast and HeLa epithelioid cervix carcinoma cells. AA

Grapefruit juices

1398

Low (NH) and Wudrich (GG). **Detection of inexpensive sweetener addition to grapefruit juice by HPLC-PAD.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 902-909

Fingerprint oligosaccharide analysis by HPLC with pulsed amperomeric detection was used to detect adulteration of grapefruit juice. 30 pure grapefruit juice samples were analysed, 15 fresh-pressed/pasteurized juices and 15 concentrates. Individual inexpensive sweeteners (high-fructose corn syrup, beet medium invert sugar and beet invert sugar) were added to pure grapefruit juice samples at 5, 10 and 20%. Each of these materials could be detected (at 5% levels) when added to grapefruit juice. The origin of the oligosaccharides in each of these inexpensive sweeteners was elucidated. The elution programme was shortened to 115 min (total time between sample analysis), which is more conducive to routine sample analysis. AA

Lime juice concentrates

1399

Bhalerao (SD). **A factorial approach to identify reactive constituents and their interactions in multicomponent highly acidic model systems simulating lime juice concentrate (32°C).** *Journal of the Science of Food and Agriculture* 63(1); 1993; 91-94

The non-enzymic browning mechanism in a multicomponent food product such as lime juice concentrate (32°Brix) was investigated using synthetic model systems. A 2-5 factorial experiment was designed and the statistically significant main effects and interactions isolated. 4 interactions (i) citric acid + ascorbic acid, (ii) citric acid + fructose, (iii) fructose + ascorbic acid, and (iv) citric acid + fructose + ascorbic acid and 3 main effects (i) citric acid, (ii) fructose and (iii) ascorbic acid were found to be statistically significant at the 0.05 level. These are interpreted in the light of available literature on non-enzymic browing reactions. AA

Pear juice concentrates

1400

Saenz (C), Sepulveda (E), Araya (E) and Calvo (C). **Colour changes in concentrated juices of prickly pear (*Opuntia ficus indica*) during storage at different temperatures.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 417-421

Tea

1401

Powell (C), Clifford (MN), Opie (SC), Ford (MA), Robertson (A), Gibson (CL). **Tea cream formation: the contribution of black tea phenolic pigments determined by HPLC.** *Journal of the Science of Food and Agriculture* 63(1); 1993; 77-86

Reverse-phase HPLC of liquors prepared from a Lattakari Assam black tea was used to assess the contribution of black tea phenolic pigments to tea cream, a precipitate which forms routinely following caffeine complexation of the phenols when a strong infusion of black tea cools. Caffeine was added back to tea liquor and reconstituted decaffeinated whole tea liquor; the extent to which theaflavins, thearubigins and flavonol glycosides were removed from solution in the form of insoluble complexes was monitored by HPLC. The poorly characterized thearubigins are shown to be the principal (approx. 86%) pigmented phenolic components of tea cream. Theaflavins (approx. 12%) and flavonol glycosides (approx. 2%) were also present. Evidence is presented for a synergistic interaction between theaflavins and thearubigins during cream formation. Use of caffeine precipitation is proposed as an aid to the fractionation and quantification of phenols including thearubigins in black tea liquors. AA

1402

Owuor (PO) and Odhiambo (HO). **The response of quality and yield of black tea for two *Camellia sinensis* varieties to methods and intervals of harvesting.** *Journal of the Science of Food and Agriculture* 62(4); 1993; 337-343

Effects of black tea var. (sinensis or assamica), plucking (harvesting) round length and method of harvesting on sensory properties and chemical quality parameters were studied. Hand plucked teas contained higher amounts of theaflavins (TF), caffeine and Group II volatile flavour compounds (VFC) and had higher brightness values and flavour index than shear plucked teas; however, they had lower amounts of Group I VFC, irrespective of var. Black teas plucked from short plucking rounds were superior to those from long plucking rounds with respect to TF, caffeine, brightness, chemical aroma quality parameters and sensory analysis. Long plucking intervals and shear plucking reduced tea yields and produced coarser leaves than short plucking intervals and hand plucking. BV

FATS AND OILS

1403

Hunter (JE) and Applewhite (TH). **Correction of dietary fat availability estimates for wastage of food service deep-frying fats.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 613-617

1404

Ang (JF). **Reduction of fat in fried batter coatings with powdered cellulose.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 619-622

Fat contents of fried batter coatings were reduced significantly (7-28%) when 1% powdered cellulose (fibre length in excess of 100 μm) was incorporated into the batter. In addition, moisture and DM contents were increased significantly in these coatings. Although fat reductions were observed in both shortening and oil, cellulose had a greater effect in shortening. The decrease in fat and increase in moisture could be due to hydrogen bonds forming between water molecules and cellulose fibres. Results from water and oil retention capacities indicate that powdered cellulose is more hydrophilic than lipophilic. This could also restrict the displacement of water by fat during frying. AA

1405

O'Donnell (C) and Best (D). **Fats fight back.** *Prepared Foods* 162(2); 1993; 41-42

Discusses US regulations on nutritional labelling and health claims of total fat, saturated fat, trans-fatty acids, cholesterol and omega-3 or omega-6 fatty acids in food products. Other aspects considered include: commercial introduction of structured lipids (caprenin); triglyceride rearrangement and transesterification; and creation of unique fats with unique properties. BV

Cocoa butter

1406

Goh (SH), Yeong (SK) and Wang (CW). **Transesterification of cocoa butter by fungal lipases: effect of solvent on 1,3-specificity.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 567-570

Effects of solvents (hexane and diethyl ether) on 1,3-specificity of transesterification of cocoa butter, catalysed by immobilized lipases of *Mucor miehei* and *Humicola lanuginosa* were studied using GC and NMR spectroscopy. Results indicated that using hexane as solvent, *M. miehei* and *H. lanuginosa* lipases were not 1,3-specific. Large amounts of oleic acid were liberated, indicating reaction of fatty acids from position 2. When diethyl ether was used as solvent, both lipases clearly demonstrated 1,3-specificity. BV

Oils

1407

Gilkison (IS) and Shone (GG). **The rearrangement of fatty cyclopropenoids in the presence of boron trifluoride.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 607-612

Cottonseed and kapok oils contain the cyclopropenoid fatty acids 9,10- methyl eneocta dec-9- enoic (sterculic) and 8,9-methylene- heptadec-8-enoic (malvalic) acids in glycerides; these compounds may have adverse physiological effects which must be destroyed. Destruction of the cyclopropenoid ring system of methyl 9,10-methyleneoctadec-9-enoate (methyl sterculate) with boron trifluoride etherate was shown to give a complex mixture of products, including methyl esters of C_{19} allenes (12%), a C_{18} alkyne (11%) and a variety of C_{19} and C_{20} conjugated dienes containing either a methyl or methylene branch. The methylene group lost from the methyl sterculate reactant in the formation of methyl octadec-9-ynoate was incorporated into a second molecule of reactant to yield a mixture of methyl 9-methylene-trans-nonadec-10-enoate and the 11-methylene-trans-9-isomer. The use of boron trifluoride eliminated the possibility of formation of irreversibly adsorbed products. BV

Avocado oils

1408

Lozano (YF), Mayer (CD), Bannon (C) and Gaydou (EM). **Unsaponifiable matter, total sterol and tocopherol contents of avocado oil varieties.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 561-565

Sterols and tocopherols contents of 4 avocado oil from avocado var. (Zutano, Bacon, Fuerte and Lula) were determined by HPLC. Both ripe and unripened fruits were studied. Sterol contents in oil were higher in unripened (1.1-6.2%) than in ripened (0.8-2.0%) avocados. Tocopherols contents varied between var. and tocopherols in oil were higher in unripened (20.1-45.6%) than in ripe fruit (5.7-10.3%). BV

Castor oils

1409

Kula (J) and Sadowska (H). **One-pot synthesis of (E)-2-nonenal from castor oil.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 643-644

A one-step procedure for preparation of (E)-2-nonenal [for using as a flavouring] from commercial castor oil by ozonolysis in acetic acid, followed by exposure of the resulting intermediate product to *p*-toluene sulphonic acid, is described. The manufactured aldehyde is of high purity (99%) and the method is simple and uses inexpensive raw material. The aldehyde can be added to naturally or synthetically flavoured food stuffs (meat, coffee, and other beverages). BV

Coconut oils

1410

Lih (L-W), Bao (K-Y), Parkin (KL) and Johnson (EA). **Inhibition of *Listeria monocytogenes* by monoacylglycerols synthesized from coconut oil and milkfat by lipase-catalyzed glycerolysis.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 1000-1005

Monoacylglycerols (MAG) synthesized from coconut oil and milk fat were evaluated in brain heart infusion (BHI) broth and in pasteurized milk for antimicrobial activity against the Scott A strain of *L. monocytogenes*. MAG were produced by solid-phase glycerolysis catalysed by lipase PS-30 from *Pseudomonas* sp. and purified by hexane fractionation. Purities of MAG from coconut oil and milk fat before hexane fractionation were 74.6 and 54.5% and after fractionation were 97.5 and 95.7%, respectively. Fractionated coconut MAG had slightly more inhibitory activity towards *L. monocytogenes* than unfractionated MAG. *L. monocytogenes* was inactivated by hexane-fractionated coconut MAG at 250-400 µg/ml in pasteurized skim milk, at 500-750 µg/ml in 2% milk and at 750-1000 µg/ml in whole milk at 4°C, but the MAG were less inhibitory at 13°C and at room temp. MAG prepared from coconut oil were more effective than monolaurin against *L. monocytogenes* in

BHI and pasteurized milk, whereas MAG made from milk fat did not inhibit *L. monocytogenes* in pasteurized milk. The composition of fatty acids present in the coconut MAG was associated with the anti-listerial activity, lauric acid (C_{12}) being the most active fatty acid of the series C_8-C_{14}. Certain combinations of the MAG, particularly monocaprin and monolaurin, showed synergistic activity against *L. monocytogenes*. Results indicate that MAG synthesized from coconut oil could be used to control *L. monocytogenes* in certain dairy products or in other foods that contain reduced fat. AA

Groundnut oils

1411

Singleton (JA). **Enrichment of phospholipids from neutral lipids in peanut oil by high-performance liquid chromatography.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 637-638

Phospholipids from crude peanut oil were enriched on a 2-cm silica column and subsequently separated from neutral lipids by HPLC without prior concn. Hexane effectively removed bulk neutral lipids, leaving adsorbed phospholipids on the silica precolumn. Individual phospholipids were separated from the remaining neutral lipids and from each other using 2 mixed solvents and a gradient programme. This method separates the phospholipids in approx. 27 min after the desired enrichment level has been reached. AA

Onosmodium hispidissimum

1412

MacKenzie (SL), Giblin (EM) and Mazza (G). **Stereospecific analysis of *Onosmodium hispidissimum* Mack. seed oil triglycerides.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 629-631

The fatty acid composition of *Onosmodium hispidissimum* Mack. seed oil [rich in γ-linolenic (LA) and stearidonic acids (SA)] and the stereospecific distribution of γ-LA and SA in the seed oil triglycerides were determined. The seed oil contained approx. 20% γ-LA and 8% stearidonic acid. Approx. 90% of both γ-LA and SA were esterified to the *sn*-2 and *sn*-3 positions. BV

Sesame oils

1413

Vazquez (TJF) and Uribe (RA). **Adsorption isotherms of sesame oil in a concentrated miscella system.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 589-594

Adsorption of peroxides, unsaturated carbonyls, free fatty acids and carotenoids from unrefined sesame oil on vegetable carbon (5%, w/w) in a miscella system was studied. 3 different solvent conditions (hexane/ethanol, 100:0, 95:5 and 75:25, vol./vol.), combined in a factorial design with 5 levels of solvent (0, 10, 20, 30 and 40% w/w), were used to develop the miscella. Equilibrium adsorption was not achieved during the 100 min of adsorption, mainly because oil components were involved in oxidation reactions during the adsorption process. However, for a given solvent concn., adsorption of oil components showed a significant linear regression on their respective initial concn. in the miscella (C_I). Peroxides and carbonyls showed, at all solvent levels investigated, an affinity for the carbon more independent of their C_I than free fatty acids and carotenoids. In general, at the same C_I, a higher adsorption was achieved as solvent concn. increased. Results indicated that free fatty acids absorption may depend on competitive adsorption based on molecule hydrophobicity. However, in spite of the higher hydrophobicity of carotenoids, compared with free fatty acids, they might not be competing for the same adsorbing sites. Ethanol showed a prooxidant effect that increased peroxide production during adsorption but did not affect the reaction involved in carbonyl production. AA

Soybean oils

1414

Mingyu (J) and Proctor (A). **The effect of added solvents on soy oil lutein adsorption by silicic acid.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 575-578

Soy oil miscellas were prepared by diluting soy oil with hexane. Solvents used included: water;

methanol; ethanol; n-propanol; isopropanol; n-butanol; isobutanol; 2-octanol; 1-nonanol; and 1-decanol. Propanal, acetone, 2-butanone, acetic, propionic, n-butyric, isobutyric and octanoic acids, and methyl and ethyl acetates were also used. Lutein adsorption followed a Freundlich isotherm and added solvent reduced lutein adsorption to silicic acid. Alcohols were the most effective solvents for inhibiting lutein adsorption. Propionic acid was the most effective non-alcohol solvent, but most non-alcohol solvents were ineffective. Results indicated that alcohols may compete more effectively with lutein for adsorption sites due to their ability to form hydrogen bonds with silanol groups. BV

1415

List (GR) and Mounts (TL). **Origin of the nonhydratable soybean phosphatides: whole beans or extraction?.** *Journal of the American Oil Chemists' Society* 70(6); 1993; 639-641

Whole soybeans and flakes, tempered to normal (10%) and elevated (14%) moisture levels, were stored and then extracted under a variety of conditions in the presence or absence of phospholipase activity. Crude oils were degummed and the resulting nonhydratable phosphatide (NHP) content was determined. Extractions performed on flakes at ambient temp. or at the b.p. of hexane showed that at normal (10%) moisture levels extraction temp. had little effect on the magnitude of NHP formation; whereas at 14% moisture, considerably higher levels of NHP were observed at the higher extraction temp. Studies performed with 10 and 14% moisture whole beans stored at 40°C for extended periods, with or without inactivation of enzymes, showed that at normal 10% moisture levels little deterioration occurred after 1 wk of storage; however, after 4 wk considerable NHP is formed. At 14% moisture, NHP formation was rapid during the first wk of storage, and complete destruction of phospholipid occurred after 4 wk storage at 40°C. Results indicate that the adverse effects of storage conditions, excessive moisture levels and elevated temp. cannot be overcome by inactivation of phospholipase D prior to solvent extraction of soy flakes. AA

Sunflower oils

1416

Kaya (A), Tekin (AR) and Oener (MD). **Oxidative stability of sunflower and olive oils: comparison between a modified active oxygen method and long term storage.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 464-468

Shelf-lives of sunflower (SO) and olive oils (OO) subjected to long term storage were determined; results were compared to those from an accelerated shelf life testing method. Effects of container properties (packaging material, O_2 permeability and transparency) on shelf-lives were also studied. Peroxide values were measured to determine oxidative stability. Oil samples in PET bottles, clear glass bottles and coloured bottles were aged at 10 and 20 plus/minus 0.2°C under a fluorescent lamp. Analysis was in terms of milli-equivalents of peroxides per 1000 g of sample. Under retail storage conditions, shelf-lives of the SO and OO were 10.6 and 20.8 months, respectively. Shelf-life of SO in the PET, clear glass and coloured glass bottles was 10.4, 11.1 and 11.8 months at 10°C, and 4.8, 5.1 and 6.5 months at 20°C, respectively; at 10°C, shelf-life of OO was 17.5, 17.8 and 18.3 months and 8.0, 8.4 and 8.7 months at 20°C, respectively. BV

SPICES AND CONDIMENTS

Spices

Basil

1417

Rocha (T), Lebert (A) and Marty (A-C). **Effect of pretreatments and drying conditions on drying rate and colour retention of basil (*Ocimum basilicum*).** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 456-463

SENSORY EVALUATION

1418

Lytle (PC). **Innovations in flavour development: A case study.** *Food Technology* 48(2); 1994; 94-97

This case study tracks the impact of sensogen's flavour development work on a new product for one of the world's largest companies. It demonstrates the advantages created through strategic partnerships where technology is shared. CSA

1419

Kimmel (SA), Sigman-Grant (M) and Guinard (J-X). **Sensory testing with young children.** *Food Technology* 48(3); 1994; 92-94, 96-99

The purpose of the study was to develop and evaluate reference methodology for sensory testing with young children. Specific objectives were: (1) to determine which sensory tests can be used; (2) the age at which children develop the cognitive ability required to understand sensory tests; and (3) the effect, if any, of the testing environment on a childs response. The implications drawn were that children can be a valuable measuring tool for sensory testing if appropriate testing environment and protocol are used. CSA

FOOD STORAGE

1420

Leistner (L). **Food preservation by combined methods.** *Beverage and Food World* 21(3); 1994; 8-10

Water activity and food preservation, Hurdle effect and food stability, Hurdle technology and food design, shelf stable products storable without refrigeration, novel and traditional intermediate moisture foods based on meat are the aspects described in this article. SRA

INFESTATION CONTROL AND PESTICIDES

1421

Auld (GW), Kendall (PA) and Chipman (H). **Consumer and producer perceptions and concerns regarding pesticide use.** *Food Technology* 48(3); 1994; 100, 102, 107-109

Focus groups were conducted among consumers and producers to understand the perspectives and concerns about agricultural chemicals. The profile, responses (food preferences and concerns, pesticide safety concerns, pesticide control, organic option) and perceptions of the focus groups are dealt. The results show that the focus group participants believed that pesticide use was driven by consumer demand. CSA

1422

Rangaswamy (JR) and Gunasekaran (N). **Free phosphine in the void space of food commodities during phosphine fumigation.** *Lebensmittel Wissenschaft und Technologie* 26(5); 1993; 447-449

On fumigation with 6 phosfume tablets/t, cereals and milled wheat products showed greater amounts of free phosphine in their void space than gram, dhal and paddy. Paddy retained the least amount at 40 μg/mg. Raw rice retained a greater amount of free phosphine than paddy; dhals retained less than the corresponding grams before milling. Arabica coffee beans retained less free phosphine than Robusta beans. It is concluded that it is not advisable to offer the same dose for all commodities, as the free phosphine content in the void space is different for different commodities. BV

1423

Halstead (DGH). **Keys for the identification of beetles associated with stored products. II. Laemophloeidae, Passandridae and Silvanidae.** *Journal of Stored Products Research* 29(2); 1993; 99-197

Key features for the identification of the beetle families Laemophloeidae, Passandridae and Silvanidae found in stored products throughout the world are provided. Pest spp. which are regularly brought into the store with the crop, and spp. which are found in stored products mainly because of their association with dunnage or structural timbers are included. 47 spp. and 18 genera are described. Notes on distribution and biology including several new storage and field distribution records are also provided. BV

1424

Rostom (ZMF). **Survey of some granivorous and non-granivorous insects and mites of stores in Saudi Arabia.** *Journal of Stored Products, Research* 29(1); 1993; 27-31

Insects and mites infesting wheat, maize, wheat bran and dust samples, stored in or collected from Riyadh and Dammam Provinces, Saudi Arabia, during 1987 and 1988, were identified. Of these pests, 16 spp. of insects were mainly granivorous. Another 26 insects spp. and 7 mite spp. were mainly non-granivorous, being either predators, parasites, scavengers or incidentals. The relative abundance of the different species is discussed, and found to be dependent on season, province and type of commodity. Species found in both season and provinces, including 9 granivorous (4 *Trogoderma* spp., *Tribolium castaneum*, *Latheticus oryzae*, *Rhyzopertha dominica*, *Liposcelis* sp. and one *Thysanoptera* sp. beside *Coleoptera* larvae) and 2 non-granivorous (1 *Cecidomyiidae* sp. and *Acaropsis sollers*) spp. AA

BIOCHEMISTRY AND NUTRITION

1425

Best (D). **Piecing together the nutrition puzzle.** *Prepared Foods* 162(3); 1993; 44, 46, 48, 50-51

The effects of changing knowledge of nutrition on nutritional regulations for foods are described. Aspects covered include: nutritional variability and diversity between individuals; implications for nutritional labelling; personalized nutrition; macro-nutritional needs applicable to the general population; nutritional advice for heart disease; and implications for food regulations and health claims. BV

TOXICOLOGY

1426

Pitt (RE). **A descriptive model of mold growth and aflatoxin formation as affected by environmental conditions.** *Journal of Food Protection* 56(2); 1993; 139-146

A model which integrates literature data on the effects of temp., a_w, pH and colony size on mould growth and aflatoxin formation is presented. Mathematical forms for the rates of growth and toxin formation are based on assumptions about the biology of toxigenesis. An Arrhenius-like function is postulated for effects of temp.; shape parameters in the function are selected assuming that optimum temp. bears a fixed relationship to temp. limits for growth and toxigenesis, which vary with a_w. A linear function is postulated for effect of a_w with the lower limit dependent on temp. Parabolic and Monod models are used to describe effects of pH and colony size, respectively. Toxigenic parameters are estimated by comparing model simulations to results of 2 published studies, with fair consistency in the 2 sets of parameters. The model did not correctly projectthe effects of spore load, but did correctly predict toxigenic behaviours relating to effects of temp. and temp. cycling. The model provides a theoretical explanation for observed temporal shifts in the optimum temp. for toxigenesis, and for a hyperbolic relationship between heat units and time to toxigenesis with and without temp. cycling. CSA

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GENERAL

1427

Sardana (V) and Vaidya (R). **Quality problems in agro industries: Challenges and approaches.** *Indian Food Packer* 48(4); 1994; 29-32

Basic concepts of quality, quality control and quality assurance; and their need and importance for food industries are discussed. Suitable solutions to problems of quality control in food industries in India are suggested. GS

1428

Friedman (M). **Prepared produce saves consumers valuable time.** *Prepared Foods* 162(6); 1993; 49

Fresh, processed products introduced onto the US market is discussed. Aspects discussed include: chopped, diced, washed, mixed and packaged products; ready salad blends; spinach salad mixes; prepared vegetables; vegetable coleslaws containing broccoli, red cabbage and carrots; baking potato packs for the microwave; prepared pineapple in pouches; prepared fruit salads; sun-dried products (tomatoes, cranberries and blueberries); and exotic trail mix. BV

1429

Davis (S). **New soup offerings are usin' the old noodle.** *Prepared Foods* 162(5); 1993; 105

New product introduced in the soups category in the US in 1992 are described. There were 54 newer items in this category in 1992. Aspects included: healthy-labelled soups; noodle-containing soups; soups with no added salt; and ethnically influenced soups. BV

1430

Dornblaser (L). **Processors up the ante on entree quality.** *Prepared Foods* 162(5); 1993; 83-84

New product introduce in the entrees category in the US are discussed. Aspects considered include: pizza; cooked breakfast products; bottled dinner mixes; and dinners for children. BV

1431

Friedman (M). **Recession blues finally impact new products.** *Prepared Foods* 162(5); 1993; 44-45

The effect of the recession on the rate of new food product introduced onto the market in the US in 1992 is discussed. Total new food items introduced declined by 0.7% in 1992, following a 20% increase in 1991. Aspects discussed include: categories in which decline was reported; categories in which increases were reported; domination of line extensions; effect of labelling regulations on healthy claims; cluster brands; improved sales of private labels; speciality food introductions; increase in the condiment category; and calorie consumption. BV

1432

Friedman (M). **Gazing into the crystal ball for 1993.** *Prepared Foods* 162(5); 1993; 27-28

Predictions for new product introduced in the US market in 1993 are described. Aspects described include: food kits for those who enjoy making foods; ultra-concentrated products; do-it-yourself pizza toppings; fruit sauces to be used as fat/sugar substitutes in bakery products; vegetable juices; prepared salad mixes; fresh pasta sauces; cookies; biotechnologically derived potatoes; nutraceutical foods; antioxidant formulations; clear beverages; vegetarian products; tuna burgers; foods containing anticarcinogens; and foods adapted to FDA requirements. BV

1433

Lehrer (SB) and O'Neil (CE). **Occupational reactions in the food industry.** *Indian Food Industry* 12(4); 1993; 40-46

Food industry employees are exposed to a wide var. of substances and some of which can induce allergic reactions. Agents encountered in food-related industries (coffee) reported to induce occupational asthma (OA) is reported. Diagnosis, treatment of OA and coffee bean hypersensitivity are the aspects considered. CSA

1434

Jayaraman (KS). **Some process technologies for the preparation of convenience foods from fruits and vegetables for defence services.** *Indian Food Industry* 12(5); 1993; 32-40

Some of the process technologies developed and used to prepare ready-to-eat or quickly reconstitutable convenience foods from fruits and vegetables for use by the Armed forces with ample scope for application in the civil sector are highlighted. Technologies described include dehydration of vegetables by a high temp. short time (HTST) pneumatic drying to bring about porosity and incorporation of additives like salt and sucrose by soak infusion to minimise shrinkage, quick-cooking vegetables curry (Avial) mix, intermediate moisture fruits and vegetables, fruit bars, spray-dried fruit flavoured milk, lassi-beverage powders and instant soup mixes. CSA

FOOD PROCESSING

1435

Decker (SJ). **Extraneous matter in food processing and storage.** *Dairy, Food and Environmental Sanitation* 14(1); 1994; 12-15

The significance of extraneous matter including classifications and federal regulations are discussed and analytical methods used for the detection of extraneous matter in food products is reviewed. Types of contaminants and their importance, regulatory enforcement (defect action levels), macroanalytical procedures (light filth procedures, hair identification) stored product pests - "insects", insect fragments and their identification are the aspects covered. 14 references. SRA

1436

Sankat (CK) and Maharaj (V). **Drying the green herb *Shado beni* (*Eryngium foetidum* L.) in a natural convection cabinet and solar driers.** *ASEAN Food Journal* 9(1); 1994; 17-23

The food flavouring herb 'Shado beni' (*E. foetidum* L.) was dried in natural convection cabinet dryer at 35, 45, 55 and 65°C to determine its drying characteristics. Drying in the falling rate period was strongly temp. dependent with 2 drying periods adequately describing the drying behaviour. Drying constants were 0.064 h^{-1}, 0.265 h^{-1}, 0.0296 h^{-1} and 0.782 h^{-1} for the 1st falling rate period at all 4 temp. respectively. In 2 similar low cost, natural convection, solar driers of direct and indirect types operating at daily temp. of 39.5 and 37.6°C respectively, the herb's moisture content was reduced from an initial value of 8.55 - 9 and 20% for the direct and driers respectivley, in 5 days. On drying, the volatile oil content of herb droped from 0.84 - 0.12% for direct and 0.19% for direct dryers. Blanching herb in hot water at 96°C, followed by drying in the indirect dryer reduced the loss of green colour, normally observed on drying without pre-treatment. Blanching did not affect the drying rate behaviour of the herb. SRA

FOOD PACKAGING

1437

Forcinio (H). **Great expectations: packaging technology meets today's multiple needs.** *Prepared Foods* 162(5); 1993; 32-34

The expanding role of food packs is discussed with respect to the increasing expectations. (packs must be convenient, retain freshness, be environmentally friendly, be easy to store, open and use, stand out, be cost effective, and handle efficiently on the production line) placed on their performance. Packaging developments of 1992 in the US are described with regard to these expectations. Aspects considered include: easy-open plastics ends (especially for children); product-visible packaging; bakeable film overwraps for biscuits; shrink wrap packs for premeasured foods; resealable serving bowls; and multilayer paper cups for microwaveable soups. BV

1438

Swientek (B). **Pumping up packaging line efficiencies.** *Prepared Foods* 162(4); 1993; 68-71

Increase of food packaging production capacity using emerging technologies and software tools is described. Aspects considered include: packaging line improvement; motion analysis systems for high-speed packaging lines; flexibility and automation of packaging lines; Japanese strategies (more capacity surplus is built into their packaging lines); simulation modelling (addressing dynamic interactions of a line's components and measuring overall system efficiency and control stability); and use of animation graphics to enhance visual understanding of process performance. BV

1439

Anon. **Environmentally correct '90s spur grocery package recycling.** *Prepared Foods* 162(3); 1993; 87-88

Trends in the recycling of grocery packaging are discussed with respect to a survey conducted from 1980 to 1990. Aspects considered include: highlights of the study; recycling centres; barriers to recycling; FDA guidance document for recycling materials; US recycling regulations; and trends in global recycling. BV

FOOD ENGINEERING AND EQUIPMENT

1440

Radha Charan, Arup Dutta and Mathur (S). **Specific heat of some liquid foods.** *Beverage and Food World* 21(4); 1994; 9-10, 12

This paper presents the method of sp. heat (SH) detn. by law of cooling apparatus and also deals with the effect of total solids (TS) on SH of liquid foods (cow milk (CM), toned milk (TM), orange juice (OJ) and sugarcane juice (SCJ)). The Av. initial TS of CM, TM, OJ and SCJ were 13, 11, 13 and 8% respectively. The av. SH of CM varied from 0.9 - 0.787 kcal/kg^{o}C, when the TS varied from 13 - 26%. The av. SH of TM varied from 0.92-0.76 kcal/kg^{o}C, when TS varied from 11 - 28%. Similarly the av. SH of OJ and SCJ varied from 0.89 and 0.83 kcal/kg^{o}C - 0.79 and 0.73 kcal/kg^{o}C when the TS varied from 13 and 8 to 35 and 36% respectively. SRA

1441

Kim (Y-H), Nelson (JT) and Glynn (AB). **Meso-scale modelling of polymers and its applications in food technology.** *Cereal Foods World* 39(1); 1994; 8-16, 18

Presents a general discussion of computer simulation and its uses, as well as a description of the unique features of meso-scale modeling for solving polymer problems in food science and technology. CSA

1442

Pruthi (JS). **Quick frozen food industries - a global overview.** *Indian Food Packer* 48(3); 1994; 47-58

Frozen seafoods occupy the top rank followed by ready-to-serve meals, vegetable and poultry. Based on a market research survey, production, consumption and international trade of quick frozen foods in developed countries like USA, Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, Japan, Thailand, Hongkong, Singapore, Chile and India are reviewed. GS

1443

Swientek (B). **Robotics: get a grip on it.** *Prepared Foods* 162(6); 1993; 80-82, 84

Discusses the use of robotic systems to build flexibility into existing food manufacturing operations, which can react quickly to fast-changing market conditions. Aspects discussed include: flexibility of the use of robotics in food manufacturing; automation; advances in robotics and related technology; use of robotics to eliminate the need for exposing workers to repetitive motion tasks and harsh environments; equipment selection; and use of robotic applications in food palletizing operations. BV

1444

O'Donnell (CD). **The formulation challenge. Formulating for the big freeze.** *Prepared Foods* 162(6); 1993; 55-56

Discusses the development of frozen foods which have the characteristics of fresh foods, with respect to the use of additional ingredients that function within the framework of freezing technologies. Aspects discussed include: effects of freeze concn. and frozen storage on quality; importance of the glassy state; formulation of foods with enhanced stability to freezing (by altering ingredients, altering glass transition temp.); and use of antioxidants and barrier films. BV

1445

Hingorani (NA). **Scope of supercritical fluid extraction technology in India.** *Indian Food Industry* 12(5); 1993; 30-31, 40

Aspects described in this article are CO_2 as supercritical fluid (SCF), application of SCF extraction in food processing and other industries, advantages of SCF with CO_2 process compared to conventional solvent extraction process, manufacturers of SCF extraction plant, status of R and D in India - SCF technology and scope of SCF extraction technology in India. CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1446

Jinap (S). **Organic acids in cocoa beans - a review.** *ASEAN Food Journal* 9(1); 1994; 3-12

Cocoa beans contain about 0.47 - 1.02% volatile acids (acetic, propionic, butyric, isobutyric and isovaleric) and 1.01 - 1.88% nonvolatile acids (oxalic, citric, malic, succinic, lactic and tartaric). Aspects covered are: occurrence of acids; acid development during post-harvest, fermentation, roasting, conching; contribution of acid to flavour and acids responsible for acidic taste. SRA

Chemistry (analytical)

1447

Yamada (S), Noda (N), Mikami (E) and Hayakawa (J). **Analysis of natural coloring matter in food. 4. Methylation of cochineal color with diazomethane for the analysis of food products.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1071-1075

A TLC method for detecting cochineal involving methylation with ethereal in tetrahydrofuran was developed. 65 foods samples (including candy, fruit juice, jelly, ice cream, steamed rice cakes, loin ham and Vienna sausage) were analysed for cochineal using the TLC method with cleanup on a Sep-Pak C18 cartridge. Using chloroform:methanol:water (65:35:10) as mobile phase, all methylated cochineal preparations gave a reddish orange spot at Rf 0.75. The compound with Rf 0.75 was identified as 3,6-di-O-methylcarminic acid methyl ester. Cochineal was detected in 23 of the foods analysed. BV

FOOD MICROBIOLOGY AND HYGIENE

1448

Hahnau (S) and Weiler (EW). **Monoclonal antibodies for the enzyme immunoassay of the mycotoxin cyclopiazonic acid.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1076-1080

Murine monoclonal antibodies (MAB) were raised from hybridomas obtained by fusions of splenocytes from Balb/c mice immunized intraperitoneally with cyclopiazonic acid-keyhole limpet haemocyanin (CPA-KLH) conjugates, with different myeloma lines. Hybridomas secreting antibodies against CPA were detected by enzyme immunoassay, purified by limiting dilution cloning and adapted to a batch fermentation process for the large-scale production of MAB. From 15 independent hybridomas obtained, 1 was used further. MAB S14-2-B6 (IgG1) was extremely selective for cyclopiazonic acid (the only cross-reactant detected was cyclopiazonic acid imine, which had a cross-reaction of 20%) and could be used in an antibody-immobilized enzyme immunoassay format measuring 7-300 ng mycotoxin per assay. The intra-assay coeff. of variation is 2.5%, and inter-assay variability is 4.4% (within-day) and 8.1% (between-day). Crude extracts from fungal strains were analysed for CPA, allowing screening of fungal isolates for toxin production. The assay can be used to analyse white-mould fermented cheese for CPA. AA

1449

Schoeller (C), Chaudhuri (JB) and Pyle (DL). **Emulsion liquid membrane extraction of lactic acid from aqueous solutions and fermentation broth.** *Biotechnology and Bioengineering* 42(1); 1993; 50-58

Studies on the batch extraction of lactic acid using an emulsion liquid membrane system are reported. The membrane phase consists of the tertiary amine carrier Alamine 336 and the surfactant Span 80 dissolved in *n*-heptane/paraffin and aqueous solutions of sodium carbonate in the internal phase. The effects of internal phase reagent, extraction temp. and initial external phase pH on extraction efficiency and emulsion swelling were examined. A statistical factorial experiment on extraction of lactic acid from clarified [*Lactobacillus delbrueckii*] fermentation broth was carried out. The extraction efficiency from the fermentation broth was lower when compared to aqueous solutions of pure lactic acid. The effect of pH and the presence of other ionic species on selectivity are discussed. AA

Enzymes

1450

Lee (KH), Lee (PM) and Siaw (YS). **Immobilization of aminoacylase by encapsulation in poly-L-lysine-stabilized calcium alginate beads.** *Journal of Chemical Technology and Biotechnology* 57(1); 1993; 27-32

Aminoacylase I (EC 3.5.1.14) *Aspergillus aminocylases*) encapsulated in calcium alginate beads stabilized with poly-L-lysine was used for the production of L-phenylalanine [a precursor of aspartame] by the hydrolysis of a racemic mixture of N-acetyl-Dl-phenylalanine. The immobilized aminoacylase was studied with respect to operational stability, thermal stability, effects of pH and temp. and kinetic constants. Leakage of enzyme from the stabilized beads was eliminated. The immobilized enzyme retained high biological activity. K_m and V_{max} values for stabilized beads were 11.11 mmol dm^{-3} and 0.076 µmol min^{-1}, respectively. Optimum pH and temp. for hydrolysis were 6.5 and 55°C, respectively. SEM revealed crosslinked structures on the surface of beads. Operational performances of the beads in a batch reaction and a packed-bed bioreactor for continuous reaction were investigated. With batch reaction, only about 5% of enzyme activity was lost within 10 reaction cycles and there was no significant loss of activity over 600 h of continuous operation after equilibrium was reached, and a conversion yield of about 80% was obtained. BV

1451

Stevenson (DE), Stanley (RA) and Furneaux (RH). **Optimization of alkyl** β-D-galactopyranoside synthesis from lactose using commercially available β-galactosidases. *Biotechnology and Bioengineering* 42(5); 1993; 657-666

Commercially available lactase (β-D-galactoside galactohydrolase, EC 3.2.1.23) enzymes from *Kluyveromyces fragilis* and *K. lactis* were used as catalysts for the production of β-galactopyranosides of various alcohols using lactose as galactosyl donor. Galactoside yields were enhanced by using the highest practical concn. of both lactose and alcohol acceptor. Concn. and thus yield, were limited by solubility of substrates. The increase in galactoside yield with increasing lactose concn. was specific to the lactose substrate and not due to aw alterations. The galactoside yield peaked after 70-80% of the lactose was consumed, due to hydrolysis of the product by the enzyme. A number of compounds with primary or secondary hydro xyl groups could act as acceptors, the essential requirement being at least some water solubility. Addition of organic cosolvents had little effect on galactoside yield except when it increased the water solubility of sparingly soluble alcohols. Some galactosides were synthesized on a gram scale to determine practical product recoveries and improve purification methods for large-scale synthesis. Initial purification by hydrophobic chromatography (for galactosides of hydrophobic alcohols) or strong anion-exchange chromatography (for galactosides of hydrophilic alcohols) separated galactosides, galactobiosides and higher oligomers from reducing sugars. A facile separation of the galactoside and galactobioside could then be effected by flash chromatography on silica gel. AA

Pectinlyase

1452

Spagna (G), Pifferi (PG) and Martino (A). **Pectinlyase immobilization on epoxy supports for application in the food processing industry.** *Journal of Chemical Technology and Biotechnology* 57(4); 1993; 379-385

Immobilization of a pectin lyase (PL, EC 4.2.2.3) purified from a commercial enzyme preparation was studied with respect to its use for fruit pulp and juice processing. 2 epoxy supports were tested for immobilization, Eupergit C (Rohm), a synthetic polymer, and γ-alumina functionalized with γ-glycidoxypropyltrimethoxysilane. For both immobilized biocatalysts, catalytic response was low. The highest response in terms of immobilization yield and immobilized PL activity was observed for Eupergit C (approx. 115 unit g^{-1} at optimum pH). AA

Microorganisms

Bacteria

1453

Ibrahim (HR), Kobayashi (K) and Kato (A). **Length of hydrocarbon chain and antimicrobial action to Gram-negative bacteria of fatty acylated lysozyme.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1164-1168

Lysozyme can be converted into a potent bactericidal protein against *Escherichia coli* by covalent attachment of 1 or 2 palmitic acids to its lysyl residues. Antimicrobial behaviour against *E. coli* K-12 3301 of lysozyme [hen egg white] covalently modified with myristic and stearic acids was studied to determine the effect of each type of fatty acid on the bactericidal action of lysozyme. All types of attached fatty acids, including palmitic acid, were able to transform lysozyme into a molecule bactericidal against *E. coli*, depending on the length and number of each type of fatty acid. Among the monoacylated lysozyme derivatives, the longer the C chain of the attached fatty acid, the more potent the bactericidal lysozyme type. Among the diacylated lysozyme derivatives, palmitoylated lysozyme was the most potent bactericidal agent. The binding capacity of purified *E. coli* lipopolysaccharide to the most potent bactericidal acylated lysozymes was stronger than to nonmodified lysozyme, whereas myristoylated lysozyme exhibited the strongest affinity. Results indicate that the bactericidal activity of modified lysozymes could be attributed to their moderately enhanced membrane fusion capabilities. AA

1454

Hanlin (MB), Kalchayanand (N), Ray (P) and Ray (B). **Bacteriocins of lactic acid bacteria in combination have greater antibacterial activity.** *Journal of Food Protection* 56(3); 1993; 252-255

Antibacterial efficiency of two bacteriocins from lactic acid bacteria, pediocin AcH and nisin, was tested individually and in combination against several Gram-positive bacterial strains including some involved in food spoilage and foodborne diseases [*Lactobacillus plantarum* NCDO 955, *Leuconostoc mesenteroides* Ly, *Pediococcus acidilactici* LB-42, *Enterococcus faecalis* MB1 and *Listeria monocytogenes* strains CA and Scott A]. Antibacterial activity of pediocin AcH and nisin was enhanced when they were in combination. The principles of this greater antibacterial spectrum have been are proposed. Bacteriocins in combinations can be used to design efficient natural food biopreservative(s). AA

1455

Vermue (M), Sikkema (J), Verheul (A), Bakker (R) and Tramper (J). **Toxicity of homologous series of organic solvents for the Gram-positive bacteria *Arthrobacter* and *Nocardia* sp. and the Gram-negative bacteria *Acinetobacter* and *Pseudomonas***

sp. *Biotechnology and Bioengineering* 42(6); 1993; 747-758

Bacillus cereus

1456

Nanmori (T), Nagai (M), Shimizu (Y), Shinke (R) and Mikami (B). **Cloning of the beta-amylase gene from Bacillus cereus and characteristics of the primary structure of the enzyme.** *Applied and Environmental Microbiology* 59(2); 1993; 623-627

The gene encoding the β-amylase of *Bacillus cereus* BQ10-S1 (SpoII) was cloned into *Escherichia coli* JM 109. A sequenced DNA fragment of 2001 bp contained the β-amylase gene. The N-terminal sequences, the C-terminal sequences and the amino acid sequences of the 5 regions of the β-amylase molecules were determined. Mature β-amylase contains 514 amino acid residues with a molecular mass of 57 885 Da. Amino acid sequence homology with those of known β-amylases was 52.7% for *Bacillus polymyxa*, 52.0% for *Bacillus circulans*, 43.4% for *Clostridium thermosulfurogenes*, 31.8% for *Arabidopsis thaliana*, 31.5% for barley, 29.9% for sweet potato and 28.9% for soybean. 10 well-conserved regions were found between the N terminus and the area around residue 430, but the C-terminal region of 90 residues has no similarity with those of plant β-amylases. The C-terminal region has homology with C-terminal regions of β-amylase from *C. thermosulfurogenes*, some bacterial α-amylases, cyclodextrin glucanotransferase and glucoamylase. Some of these sequences are known as the raw-starch-binding domain. Results suggest that *B. cereus* β-amylase has an extra domain which has raw-starch-binding ability and that the domain has considerable sequence homology with those of other amylases or related enzymes from a wide variety of microorganisms. AA

Bacillus polymyxa

1457

Pinaga (F), Pena (JL) and Valles (S). **Xylanase production by *Bacillus polymyxa*.** *Journal of Chemical Technology and Biotechnology* 57(4); 1993; 327-333

Bacillus polymyxa [CECT 153] produced high levels (12-13 U cm^{-3}) of extracellular xylanases [1,4-β-D-xylan xylanohydrolases; EC 3.2.1.8] when grown in a complex medium containing yeast extract and oat spelt xylan as N and C sources, respectively. Substantially lower yields of enzyme were produced during growth on glucose, arabinose and xylose. Meagre growth was reduced when ammonium sulphate, instead of yeast extract was used as N source. When assayed in culture broth supernatants, xylanase showed an optimum activity at 48°C and at pH values in the range 5.0-6.5. Under such conditions, the half-life of this xylanase preparation was 8 h. Mn^{2+} strongly inhibited the enzyme, and inhibition by EDTA (27% w/v) suggested dependence on a metallic ion. SDS-PAGE and zymogram overlay showed that up to 5 separate xylanases in the range of 20 to 116 kDa were produced. AA

Bacillus subtilis

1458

Anon. **Food trend favors 'can-do' enzymes.** *Prepared Foods* 162(3); 1993; 77

A food grade proteolytic enzyme derived from *Bacillus subtilis* is described which can be used as an alternative to sulphites for conditioning dough. The enzyme, HT-Proteolytic L-175, acts on the peptide bonds of gluten proteins, softening the dough for improved extensibility with reduced elasticity. It is useful for conditioning high-protein flours in crackers, cookies, pizza and other speciality bakery products. BV

Corynebacterium glutamicum

1459

Kwong (SCW), Randers (L) and Rao (G). **On-line detection of substrate exhaustion by using NAD(P)H fluorescence.** *Applied and Environmental Microbiology* 59(2); 1993; 604-606

The utility of NAD(P)H fluorescence for monitoring aerobic fermentations of the threonine auxotroph *Corynebacterium* *glutamicum* ATCC 14296 was examined. It was possible to use the information contained in the on-line NAD(P)H fluorescence signal to assess culture metabolic activities during fermentation. The first derivative of the filtered fluorescence signal, which approximates the turnover rate of the NAD(P)H pool, could be used to precisely identify the temporal points of threonine and glucose exhaustion. AA

Escherichia coli

1460

Best (D). **Solution near on *E. coli* crisis.** *Prepared Foods* 162(4); 1993; 41-42

Research currently being undertaken on control methods for Escherichia coli O157:H7 in foods is described. Aspects considered include: development of an integrated HACCP program for the meat industry; development of an *E. coli* rapid-detection kit that uses a highly selective antibody to the 0157:H7 strain; controlling animal hygiene, pre- and post-slaughter; heat sensitivity of *E. coli* 0157:H7; and areas where problems may occur (e.g. hamburgers). BV

Lactococcus

1461

Fitzgerald (G), Coffey (A) and Daly (C). **Molecular manipulations of *Lactococcus* starter cultures for food fermentations.** *Journal of Chemical Technology and Biotechnology* 58(2); 1993; 195-199

Lactococcus spp. are of great importance in starter cultures for food fermentations, particularly for dairy products but also for other foods (meat and vegetables). Genetic manipulation of *Lactococcus* has been intensively studied with the aim of producing strains with superior or novel fermentation characteristics. Recent developments in the molecular biology of lactococci are described. Aspects covered are plasmid biology; gene transfer; gene cloning; lactose metabolism; proteolytic activity; and bacteriophage resistance. BV

Lactococcus cremoris

1462

Benthin (S), Nielsen (J) and Villadsen (J). **Transport of sugars via two anomer-specific sites on mannose-phosphotransferase system in *Lactococcus cremoris*: in vivo study of mechanism, kinetics, and adaptation.** *Biotechnology and Bioengineering* 42(4); 1993; 440-448

Glucose uptake in *Lactococcus lactis* subsp. *cremoris* FD1 occurs via the mannose phosphotransferase system (Man-PTS), which is quite unspecific and allows transport of many different sugars and sugar analogues. The existence of anomer-specific sites on Man-PTS was shown by experiments where α-glucose, β-glucose, mannose and 2-deoxyglucose were added to glucose-limited chemostat cultures. A quantitative description of the competitive uptake of these sugars at the 2 sites [the α-site and the β-site] is given. The adaptation of the flux distribution between the α- and β-site is tentatively explained by the hypothesis that 2 integral membrane proteins of Man-PTS are involved in this process. AA

Lactococcus Lactis

1463

Sing (WD) and Klaenhammer (TR). **A strategy for rotation of different bacteriophage defenses in a lactococcal single-strain starter culture system.** *Applied and Environmental Microbiology* 59(2); 1993; 365-372

A new strategy for starter culture rotations was developed for a series of phage-resistant clones genetically derived from a single strain of *Lactococcus lactis* subsp. *lactis*. Phage-resistant derivatives carrying different defense systems were constructed via conjugation with various plasmids encoding abortive infection (Abi/Hsp) and/or restriction and modification (R/M) systems of different specificity. Plasmids included pTR2030 (Hsp$^+$ R$^+$/M$^+$), pTN20 (Abi$^+$ R$^+$/M$^+$), pTRK11 (R$^+$/M$^+$) and pTRK68 (R$^+$/M$^+$). Selected phage-resistant transconjugants or transformants were evaluated in different rotation sequences through cycles of the Heap-Lawrence starter culture activity test in milk contaminated with phage and whey from the previous cycle. Heap-Lawrence starter culture activity test in milk contaminated with phage and whey from the previous cycle. When used in consecutive sequence, derivative strains carrying the R/M systems encoded by pTN20, pTRK11 and pTRK68 retarded phage development when the initial levels of phage contamination were < 10^2 pfu/ml but not when levels were increased to 10^3 pfu/ml. Use of a derivative bearing pTR2030 (Hsp$^+$ R$^+$/M$^+$) contamination were high (10^6 pfu/ml). Alternating the type and specificity of R/M and Abi defences through the rotation prevented phage proliferation and in some cases eliminated contaminating phages. A model rotation sequence for the phage defence rotation strategy was developed and performed successfully over 9 cycles of the Heap-Lawrence starter culture activity test in the presence of high-titre commercial phage composites. This phage defence rotation strategy is designed to protect a highly specialized Lactococcus strain from phage attack during continuous and extended use in the dairy industry. AA

Lactococcus lactis

1464

Kiewiet (R), Kok (J), Seegers (JFML), Venema (G) and Bron (S). **The mode of replication is a major factor in segregational plasmid instability in *Lactococcus lactis*.** *Applied and Environmental Microbiology* 59(2); 1993; 358-364

Effects of rolling-circle and theta modes of replication on the maintenance of recombinant plasmids in *Lact. lactis* were studied. Heterologous *Escherichia coli* or bacteriophage lambda DNA fragments of various sizes were inserted into vectors based on either the rolling-circle-type plasmid pWV01 or the theta-type plasmid pAMbeta1. All pAMbeta1 derivatives were stably maintained. pWV01 derivatives, however, showed size-dependent segregational instability, in particular when larger DNA fragments were inserted. All recombinant pWV01 derivatives generated high-mol.-wt. plasmid multimers (HMW) in amounts that were positively correlated with plasmid size and inversely correlated with copy numbers of monomeric plasmid forms. Formation of HMW or reductions in copy numbers were not observed with pAMbeta1 derivatives. Results indicate that HMW formation and/or reduction in plasmid copy numbers is an important factor in the maintenance of pWV01 derivatives. It is concluded that theta-type plasmids are superior to rolling-circle-type plasmids for cloning in lactococci. AA

Listeria

1465

O'Donnell (CD). **Solving salad bar *Listeria*.** *Prepared Foods* 162(6); 1993; 45-46

Microbial control of foods is discussed with respect to microbial food poisoning. Aspects covered include: advances in analytical techniques; *Listeria monocytogenes* monitoring; use of barrier chemicals to prevent bacterial growth; and health advantages of dairy cultures. BV

1466

Estela (LA) and Sofos (JN). **Comparison of conventional and reversed phage typing procedures for identification of *Listeria* spp.** *Applied and Environmental Microbiology* 59(2); 1993; 617-619

1467

Facinelli (B), Roberts (MC), Giovanetti (E), Casolari (C), Fabio (U), Varaldo (PE). **Genetic basis of tetracycline resistance in food-borne isolates of *Listeria innocua*.** *Applied and Environmental Microbiology* 59(2); 1993; 614-616

Eleven of 12 tetracycline-resistant *L. innocua* strains, isolated from chicken or turkey frankfurters and Mozzarella cheese, were shown to carry DNA sequences which hybridized with the Tet M probe; of these, 2 strains also hybridized with Tet K. The remaining strain hybridized with the Tet K probe only. The Tet M determinant appeared to be located on the chromosome; in one case, it was transferable by conjugation to recipient *L. monocytogenes*, *L. ivanovii* and *Enterococcus faecalis*. AA

Pseudomonas aeruginosa

1468

Lee (KH), Lee (PM), Siaw (YS) and Morihara (K). **Kinetics of aspartame precursor synthesis catalysed by *Pseudomonas aeruginosa* elastase.** *Journal of Chemical Technology and Biotechnology* 56(4); 1993; 375-381

The elastase (proteinase), isolated from *Ps. aeruginosa* IFO 3455, catalysed the synthesis of N-benzyloxycarbonyl-aspartyl-phenylalanine methyl ester, the precursor of the dipeptide sweetener, (aspartame). The influence of methanol as a cosolvent in this synthetic reaction was investigated. Synthesis of the dipeptide precursor was most efficient in 25% (v/v) methanol, pH 7.0 at about 25°C for a reaction time of about 3 h. Activity of the enzyme was greatly reduced in 90% methanol. Values of K and K_2 for N- benzyloxycarbonyl-aspartic acid were 0.17 mol dm^{-3} and 11.9 mol dm^{-3} s^{-1}, respectively. BV

Shigella flexneri

1469

Islam (MS), Hasan (MK) and Khan (SI). **Growth and survival of *Shigella flexneri* in common Bangladeshi foods under various conditions of time and temperature.** *Applied and Environmental Microbiology* 59(2); 1993; 652-654

Survival and growth of *Shigella flexneri* were assessed in various foods (boiled rice, lentil soup, milk, cooked beef, cooked fish, mashed potato, mashed brinjal and raw cucumber). Growth at 25 and 37°C and survival at 5°C were observed by viable counts on MacConkey agar. The organism grew well in all tested foods and growth increased from 10^5 to 10^8 to 10^{10} cells/ml or g within 6 to 18 h after inoculation at 25 and 37°C. BV

Streptomyces thermoviolaceus

1470

Tsujibo (H), Minoura (K), Miyamoto (K), Endo (H), Moriwaki (M), Inamori (Y). **Purification and properties of a thermostable chitinase from *Streptomyces thermoviolaceus* OPC-520.** *Applied and Environmental Microbiology* 59(2); 1993; 620-622

A chitinase (EC 3.2.1.14) was purified from culture filtrate of *Streptomyces thermoviolaceus* OPC-520. The enzyme showed a high optimum temp. (70-80°C), a high optimum pH level (8.0-10.0), and heat stability. The enzyme showed high sequence homology with chitinases from *Serratia marcescens* QMB1466 and *Bacillus circulans* WL-12. AA

Fungi

1471

Schnuerer (J). **Comparison of methods for estimating the biomass of three food-borne fungi with different growth patterns.** *Applied and Environmental Microbiology* 59(2); 1993; 552-555

To evaluate the effectiveness of steps taken to reduce the growth of fungi in food and feed, methods that can accurately quantify the degree of fungal contamination of solid substrates are needed. The ergosterol assay was evaluated by comparing results of this assay with spore counts and hyphal length measurements made with a microscope and with cfu counts. 3 fungi with different growth patterns during cultivation on a synthetic agar substrate were used. For the nonsporulating *Fusarium culmorum*, there was good agreement between changes in hyphal length, cfu and ergosterol content. *Penicillium rugulosum* and *Rhizopus stolonifer* produced many spores, and production of spores coincided with large increases in cfu but not with increases in hyphal length or ergosterol content. Spores constituted between 3 and 5% of total fungal mass. Changes in ergosterol level were closely related to changes in hyphal length. It was concluded that ergosterol level is a suitable marker for use in quantitatively monitoring fungal growth in solid substrates. AA

Aspergillus aminoacylases

1472

Lee (PM), Lee (KH) and Siaw (YS). **Covalent immobilization of aminoacylase to alginate**

for L-phenylalanine production. *Journal of Chemical Technology and Biotechnology* 58(1); 1993; 65-70

Aminoacylase I (EC 3.5.1.14) [from *Aspergillus*] was immobilized by covalent crosslinking to alginate molecules with 1-ethyl-3-(3-dimethyl-aminopropyl)-carbodii mide HCl followed by calcium alginate bead formation. The immobilized enzyme was used for the production of L-phenylalanine from racemic mixtures of N-acetyl-Dl-phenylalanine. Different concn. of coupling reagent were tested and the coupling process was optimized. Immobilized and partially purified aminoacylase was characterized in terms of activity, operational stability, thermal stability, pH and temp. optima and kinetic constants, K_m and V_{max}. The activity of the enzyme covalently immobilized in calcium alginate beads was enhanced by about 75% compared to that of free enzyme. The beads were stable under operational conditions; they lost about 40% of their activity after 4 reaction cycles. Immobilized aminoacylase was stable over a broader pH range. It is concluded that this simple method provides irreversible immobilization of aminoacylase to give a biocatalyst with good operational stability and enhanced activity. AA

Mushrooms

1473

Geetha (D) and Sivaprakasam (K). ***Pleurotus djamor* - a new edible mushroom.** *Current Science* 64(5); 1993; 280-281

Pleurotus djamor (Fr.) Boedijn was collected for the first time in 1991 from Oil palm bunch wastes. Fungus was isolated, grain spawn prepared and the mushroom was cultivated on sterilized wastes - soaked paddy straw in poly-bags (45 x 30 cm) at 30 to 32°C and RH 70 to 90%. Yield of mushroom was 399 g from 150 g of spawn grown in a bed of 2.5 kg of sterilizaed water-soaked straw and the biological efficiency is 80%. KAR

1474

Castle (L). **Determination of acrylamide monomer in mushrooms grown on polyacrylamide gel.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1261-1263

Mushrooms (Agaricus bisporus) grown on a casing mixture containing polyacrylamide gel were analysed to assess possible uptake of acrylamide monomer from the polymer gel to the fruit during cultivation. The polymer contained 220 mg/kg residual monomer. At the application rate employed for cultivation this would give an initial monomer level of 220 μg/kg in the casing mix. Mushrooms were analysed by extraction, bromination and quantification of acrylamide as 2-bromopropenamide using GC-MS in selected ion mode. No acrylamide monomer could be detected at a limit of detection of 0.5 μg/kg. This demonstrates that acrylamide either does not translocate significantly from the mycelia to the mushroom fruit or that the monomer does not bioaccumulate, due perhaps to a high water solubility or chemical reactivity. AA

1475

Smith (ML), Taylor (HW) and Sharma (HD). **Comparison of the post-Chernobyl ^{137}Cs contamination of mushrooms from eastern Europe, Sweden, and North America.** *Applied and Environmental Microbiology* 59(1); 1993; 134-139

Rhizopus oligosporus

1476

Sargantanis (J), Karim (MN), Murphy (VG), Ryoo (D) and Tengerdy (RP). **Effect of operating conditions on solid substrate fermentation.** *Biotechnology and Bioengineering* 42(2); 1993; 149-158

The effects of environmental parameters on solid substrate fermentation (SSF) of *Rhizopus oligosporus* for protein production were studied. Parameters were air flow rate, inlet air RH, inlet air temp. and heat transfer coeff. between the outer wall of the fermentor and the air in the incubator. The air flow was supplied to effect cooling of the fermented mass by evaporation of water. A dynamic model was developed, which permitted estimation of biomass content, total dry matter, moisture content, and temp. of fermented matter. The model included the effects of temp. and moisture content on max. specific growth rate and max. attainable biomass content. Results of the simulation showed good agreement with experimental data. Results also indicated that evaporative cooling of the biomass was very effective for temp. control and air flow rate and heat transfer coeff. had strong effects but they affected the biomass morphology and were not easily controllable. A simple technique for detn. of optimum temp. and content profile for cell protein production was applied. The simulated biomass production increased considerably employing the optimum temp. and moisture content profiles. BV

Yeasts

1477

Saigal (D). **Yeast strain development for ethanol production.** *Indian Journal of Microbiology* 33(3); 1993; 159-168

Techniques to improve the efficiency of industrial yeast strains in the production of ethanol such as broadened substrate specificity, increased fermentation efficiency, greater ethanol, osmo and temp. tolerance and appropriate sedimentation characteristics are reviewed. Popular techniques are hybridization, protoplast fusion, transformation, liposome mediated transfer, rare mating, mutation and spheroplast fusion are dealt with. GS

Schizosaccharomyces pombe

1478

Uribelarrea (JL), Queiroz (H-de), Goma (G) and Pareilleux (A). **Carbon and energy balances in cell-recycle cultures of *Schizosaccharomyces pombe*.** *Biotechnology and Bioengineering* 42(6); 1993; 729-736

Schizosaccharomyces pombe was aerobically grown in a cell-recycle fermentor under various operating conditions, i.e., different bleeding rates and various separate feed rates of glucose and basal medium. C and energy balances were analysed during steady-state culture regimes, allowing growth yields and maintenance coeff. to be determined under glucose-limited and glucose-excess environments. Special attention was given to the metabolic shift from purely oxidative to respirofermentative glucose catabolism resulting from a change in the growth-limiting factor. No maintenance requirements for the C source and for energy were observed during glucose-limited culture regimes and oxidative catabolism. Under glucose excess and respirofermentative metabolism, the m_G coeff. was growth-linked, whereas enhancement of the apparent m_G coeff. observed for increased residual glucose concn. could be assigned to a decline in the ATP yield. AA

Zygosaccharomyces bailii

1479

Erickson (JP). **Hydrophobic membrane filtration method for the selective recovery and differentiation of *Zygosaccharomyces bailii* in acidified ingredients.** *Journal of Food Protection* 56(3); 1993; 234-238

A single-step enumeration and identification pour plate medium was developed for *Z. bailii* that totally inhibited environmental nonspoilage yeast and fungal growth and supported high (93.9-97%) *Z. bailii* recovery rates. It consisted of Sabouraud dextrose agar supplemented with fructose (3%), tryptone (0.5%), trypan blue (0.025%) and yeast extract (0.25%) to stimulate *Z. bailii* growth rate. Selectivity was based on the synergistic combination of NaCl (2.5%), acetic acid (0.5%) and potassium sorbate (0.01%). The recovery efficiency and specificity of the medium were significantly improved when it was adapted to the Hydrophobic Grid Membrane Filtration surface plating procedure. Incubation time was reduced from 5 to 2-3 days, and *Z. bailii* was visually differentiated from oxidative, acetic acid tolerant yeasts (*Hansenula* and *Pichia* spp.) by surface colony morphology. The optimized method assisted in successfully identifying and correcting *Z. bailii* contamination problems in acidified ingredients including pickled vegetables and pasteurized fruit juice concentrates. AA

Zymomonas mobilis

1480

Kaur (R), Gupta (RP), Sedha (RK), Neelam (V) and Pandher (MS). **Optimization of**

fermentation conditions for ethanol production using immobilized and free cells of *Zymomonas mobilis* ATCC 10988. *Indian Journal of Microbiology* 33(3); 1993; 169-173

Zymomonas mobilis ATCC 10988 cells were immobilized in sodium alginate, k-carrageenan and agar and the entrapped cells produced max. ethanol. Optimum gel concn. and cell load were determined for immobilization and ethanol production by the organism. Batch fermentation was carried out to optimize fermentation parameters like temp., pH and sugar concn. by free and immobilized cells. AA

1481

Thordsen (O), Lee (SJ), Degelau (A), Scheper (T), Loos (H), Rehr (B), Sahm (H). **A model system for a fluorometric biosensor using permeabilized** *Zymomonas mobilis* or enzymes with protein confined dinucleotides. *Biotechnology and Bioengineering* 42(3); 1993; 387-393

BIOTECHNOLOGY

1482

Best (D). **Food technology faces the future.** *Prepared Foods* 162(6); 1993; 32-33, 36, 38, 40, 42

The outlook for food prices in the US is discussed, with respect to biotechnological applications. Aspects covered include: effects of inflation; expenditure and disposable income; impact of technology at the farm level; use of biotechnology in the dairy industry; technologies for producing lactose-reduced milk; biotechnologically derived foods (delayed ripening tomatoes, soybean oils with improved nutritional profiles); economic benefits of new technologies; and regulatory status of bovine somatotropin. It is concluded that by using biotechnology, food processors will gain economically; consumers, too, will be assured of a safer, more nutritious and better tasting food supply that takes up a smaller share of their disposable income. BV

1483

Tin (CSF) and Mawson (AJ). **Ethanol production from whey in a membrane recycle bioreactor.** *Process Biochemistry* 28(4); 1993; 217-221

Ethanol production from H_2SO_4 whey permeate by *Kluyveromyces marxianus* Y-113 was examined in a membrane recycle bioreactor. The system was operated with 100% cell recycle and at a steady-state with $10\ g\ l^{-1}$ biomass. At a dilution rate of $D = 0.44\ h^{-1}$, almost complete utilization of $53\ g\ l^{-1}$ lactose was achieved with an ethanol productivity of $8.6\ g\ l^{-1}\ h^{-1}$. Increasing the inlet lactose concn. or dilution rate increased ethanol productivity but at the expense of lactose utilization. Elevated biomass or ethanol concn. markedly decreased the specific growth rate and specific ethanol production rate. AA

1484

Madhukara (K), Nand (K), Raju (NR) and Srilatha (HR). **Ensilage of mangopeel for methane generation.** *Process Biochemistry* 28(2); 1993; 119-123

Mango peel (MP) is a waste product of mango processing. Its disposal can cause pollution problems. Ensilage of MP for 6 months, the effects of ensilage on physicochemical characteristics and methane generation by an anaerobic digestion process were studied. Ensilage helped in the breakdown of polymeric constituents and the conversion of major carbohydrate components into volatile fatty acids. Ensilage MP was a useful substrate for anaerobic digestion for methane generation and the biogas yield was as high as $0.68\ m^{-3}/kg$ volatile solids (VS) added, with a methane content of 52%. This compared favourably with $0.43\ m^{-3}/kg$ VS added, and a methane content of 50%, for dried MP. Results suggest that the ensilage of MP could eliminate preprocessing (milling and pulverization). BV

1485

Lasko (DR) and Wang (DIC). **In situ fermentation monitoring with recombinant firefly luciferase.** *Biotechnology and Bioengineering* 42(1); 1993; 30-36

A novel methods is described for the online detn. of viable cell number. It was tested in fermentations of *Escherichia coli*. Cells were transfected with the gene for firefly luciferase and fed low levels of luciferin in the medium. The reaction requires ATP, so the nonviable cells cannot produce light. Thus, light production was linear with viable cell density from inoculation through most of exponential growth. Light emitted by these cells was conducted to the light detection equipment by an optical fibre. As few as a 10^6 cells/ml, or an OD600 of 0.0004, were easily detectable and concn. > 10^{10} cells/ml were well within range. Data were collected by computer, so adaptation to online control applications was straightforward. During lag phase, this method was much accurate than optical density measurements. At the end of exponential growth, rapid changes in light production marked C source depletion and onset of cell lysis. A simple model accounted for the luciferin used during fermentation and corrected the light detected to cell density. AA

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colourants

Dyes

1486

Singh (S), Khanna (K) and Singh (SA). **Technological aspects of permitted azo dyes (yellow): an overall perspective.** *Indian Dairyman* 46(7); 1994; 411-415

Yellow coloured azo dyes are used in various milk products such as icecream, yoghurt, lassi, flavoured milk, khoa and channa-based sweets; jams, jellies, canned foods; cakes; pastry; sugar confectionery; fruit squashes, cordials and nectars. Since they are soluble in water, very slightly soluble in ethanol, insoluble in vegetable oil, good fastness property at 25°C and stable in fruit acids, benzoic acids and SO_2 gas, they have extensive food applications. Sunset yellow FCF and tartrazine are the important permitted yellow azo dyes. GS

Flavourings

1487

Best (D). **Three dimensions of flavor design.** *Prepared Foods* 162(4); 1993; 30-32, 34

Design of optimum flavour systems for foods is described. Aspects covered include: failures in flavour systems development; flavour perception in foods; flavour complexity; determination of what flavours are supposed to achieve; fundamentals of taste; the 5 senses and how they affect the ultimate perception of flavour; the pharmacology of flavour; and flavour challenges (fat reduction in foods, and maintenance of microwaveable flavour quality). BV

Stabilizers

Gums

Xanthan

1488

Chinnaswamy (R) and Hanna (MA). **Xanthan: Structures, properties and uses.** *Indian Food Industry* 12(3); 1993; 27-37

Production and structure of xanthan gum, its properties (viscosity and rheological properties, compatibility with electrolytes, pH stability, effect of enzymes, effect of salts, properties to structure relationships) and the uses of xanthan gum in food industries, personal care products, industries and oil-fields are outlined in this article. CSA

CEREALS

Acha

1489

Lumen (BOde), Thompson (S) and Odegard (WJ). **Sulfur amino acid-rich proteins in acha (*Digitaria exilis*), a promising underutilized**

African cereal. *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1045-1047

Acha (*D. exilis*) has been reported to be rich in methionine and makes an excellent complement for legumes. 2 sulphur amino acid-rich proteins in acha were identified: M1, mol. wt. 19 000, 21.6% extractable protein, 6.0% Met, 6.4% Cys; and M2, mol. wt. 17 500, 12.9% extractable protein, 7.8% Met, 5.3% Cys. The N-terminal sequences of the 2 proteins had 64% similarities with each other. M2 was 72% homologous with corn zein 10 000 methionine-rich protein and its precursor, while M1 had 53% homology with a bovine transcription factor and 46% homology with *Brassica napus* Napin1 precursor and 2 eukaryotic transcription factors. BV

Breakfast cereals

1490

Garcia (V-B), Guerra (H-E), Martinez (G-E) and Montilla (J). **Liquid chromatography for the determination of 5-(hydroxymethyl)-2-furaldehyde in breakfast cereals.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1254-1255

An HPLC method for determining 5-(hydroxymethyl)-2-furaldehyde (HMF) in breakfast cereals (corn, wheat, rice, oats) is presented. HMF is extracted from ground sample (0.4 g) using deionized water (7 ml). Following centrifugation of the mixture, the supernatant is clarified with potassium ferrocyanide (15% w/p) and zinc acetate (30% w/p). After further centrifugation the supernatant is made up to a vol. of 25 ml. Prior to analysis the sample is filtered through a 0.45 μm disc filter. HMF is quantified using a reverse phase C18 column, with a mobile phase of water:acetonitrile (95:5 v/v) at a flow rate of 1 ml/min and UV detection at 285 nm. Average recovery of HMF was 97.7% and the limit of detection was 0.03 μg/g. Levels of HMF concn. ranged from 3.7 to 193.3 μg/g in 23 breakfast cereals comprising 6 brands. BV

1491

Davis (S). **A natural way to start the day.** *Prepared Foods* 162(5); 1993; 63, 66

New breakfast cereal product introduced in the US in 1992 are described. New product introduced in this category increased by 15%. Aspects described include: cereal products developed for marketing in health food stores; ready-to-eat flakes in amaranth, spelt and kamut varieties; hot cereals; and cereals with fruits and nuts. BV

Rice

1492

Prasertsan (S), Satake (T) and Yoshizaki (S). **Breaking behaviour of long grain brown rice.** *ASEAN Food Journal* 9(1); 1994; 36-41

This paper reports the breaking behaviour of long grain brown rice kernel when subjected to longitudinal tensile and compressive loadings, lateral compression and cyclic loadings. The test revealed that the broken surface comprised of many radially-oriented-small ruptured areas and the breaking mechanism was shear failure. The cohesive force of rice kernel was not isotropic. Kernel was relatively weak under transverse tensile strain. Cyclic loading test established a critical cyclic load. Force and breaking cycles exhibited an exponential relationship. SRA

Wheat

1493

McDonald (CE). **Collaborative study on particle size in wheat flour by laser instrument (AACC method 50-11).** *Cereal Foods World* 39(1); 1994; 29-33

A collaborative study was conducted on a laser instrument method to determine particle size in wheat flour. Prior to the study, instruments of the collaborators were checked with a size diagnostic kit for accuracy in determining size parameters. The laser particle size instruments gave satisfactory values for particle size parameters in a collaborative study with 7 lab. analyzing 4 flour samples - a flour sample from hard red spring wheat, a flour sample from soft red winter wheat, and the fine air-classified fractions from these flour samples. For the size parameters, vol. mean diam. and diams. for smaller-than-50, 90 and 10%, the standard deviations for repeatability in the same lab. (0.5 - 1.6 μm) and reproducibility between lab. (1.6 - 3.0 μm) were low. Repeatability and reproducibility standard deviation for particle size distribution measured as cumulative percent vol. in each of 11 instrument size channels were low for most channels. AA

1494

Wu (YV). **Protein isolate from an experimental high-protein wheat and flour.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1048-1052

An experimental high-protein (25% protein, N x 5.7 dry basis) spring wheat (ND 643) and flour from the wheat were used to prepare a protein isolate by alkaline extraction. Optimal extraction of protein was at pH 10.7 in 0.03N sodium hydroxide with a solvent:solid ratio of 6:1. The alkaline extract, after centrifugation, was adjusted to pH 6.2 to yield a precipitate and a supernatant. Bran was separated from starch by screening the second alkaline dispersion. The protein contents of isolates from ground wheat and flour were 90 and 95%, respectively, and accounted for 65 and 68% of the total N in the wheat and flour. Yields of protein isolate were 18 and 16%, respectively, for high-protein wheat and flour compared with 10% for wheat and flour from a typical hard red winter wheat. Protein isolate had a N solubility of 96% at pH 2.6 and a min. solubility of 5.7% at pH 5.8, a hydration capacity of 2.5, an emulsifying activity of 51% and an emulsion stability of 50%. AA

1495

Chin (PM) and Ingledew (WM). **Effect of recycled laboratory backset on fermentation of wheat mashes.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1158-1163

Distillers' solubles, soluble components and the liquid obtained after distillation of fermented mash and removal of distillers' grains, are often recycled as 'backset' to reduce effluent treatment costs and water usage. Recycling of laboratory distillers' solubles was carried out over 5 successive fermentations. When 50% backset was used in a 30-gal mash (30 US gal/56-lb bushel, a term used by corn distillers) using wheat as the substrate, yeast growth and ethanol production remained unaffected over 5 successive fermentations. The final cell yields approximated 9 x 10^7 yeasts/ml. The alcohol yields ranged from 5.7 to 6.0% w/v. No undesirable substances accumulated in high enough concn. to inhibit normal yeast metabolism. Ca, lactic acid and acetic acid were utilized by the yeasts and removed from the mash. Wheat mashes contained low levels of utilizable free amino N. Yeast extract added to the mash stimulated the rate (but not the amount) of alcohol produced. Optimal supplementation allowed a 40% reduction in fermentation time compared to that of unsupplemented controls. Although yeast extract contains unassimilable substances, no compounds in the backset impeded yeast fermentation through 4 cycles of backsetting at 50%. AA

MILLETS

1496

Agu (RC), Okeke (BC), Nwufo (SC), Ude (CM) and Onwumelu (AH). **Influence of gibberellic acid (GA3) on diastase and cellulase development of Nigerian millet (Pennisetum maiwa) and sorghum (Sorghum bicolor).** *Process Biochemistry* 28(2); 1993; 105-108

GA3 (0-0.30 mg/l) was sprinkled at steep-out on millet and sorghum during germination and growth at 28°C. Optimum enzyme levels were obtained when 0.20 mg/l of the additive was applied on both cereals. For millet, the highest diastase and cellulase activities were observed on the 5th day of germination (0.20 mg/l GA3 applied at steep-out), while sorghum showed highest activities of these enzymes on 4th day of germination for the same concn. of GA3. AA

Pearl millet

1497

Ansari (AA) and Shrivastava (AK). **Susceptibility of pearl millet (*Pennisetum glaucum*) varieties to toxigenic *Aspergillus ochraceus* for ochratoxin production.** *Indian Journal of Agricultural Sciences* 64(6); 1994; 421-422

Six pearl millet var. (HHB 50, MH 179, HC4, CZMP 2, ICMS 7703 and WCC 75) were inoculated with *A. ochraceus* NRRL 3174 and incubated for 14 days at 28 plus or minus 1°C. Ochratoxin A produced was 1500 p.p.b. in CZMP 2, 1275 p.p.b. in HHB 50, 1018.5 p.p.b. in ICMS 7703, 1275 p.p.b. in HC4, 850 p.p.b. in MH 179 and 797.3 p.p.b. in WCC 75. KAR

Sorghum

1498

Rajavanshi (AK), De (TK), Jorapur (RM) and Nandini Nimbkar. **Jaggery and syrup from sweet sorghum.** *Beverage and Food World* 21(4); 1994; 17-21

This paper describes the agronomy and juice characteristics made from a hybrid sweet sorghum (*Sorghum bicolor* (L.) Moench) (Madhura) syrup and jaggery. Protocols for making excellent product are outlined. Economic analysis and future R and D for this product is also detailed. Aspects covered are short season for jaggery-making, non-availability of sugarcane for jaggery making, poor efficiency of jaggery furnaces, the sols., components of Nimbkar Agricultural Research Institute program, breeding and agronomy of sweet sorghum, juice parameters, process parameters, shelf-life of jaggery syrup, biomass residue gasifier for jaggery furnace, and status of technology. SRA

PULSES

1499

Liu (LH), Hung (TV), Black (R) and Trewhella (MA). **Solubility of grain legume proteins measured by infrared spectroscopy.** *ASEAN Food Journal* 9(1); 1994; 24-29

This report evaluates the application of an infrared spectroscopic technique (milkoscan) for a study of the solubility of chickpea, field pea and soybean proteins over a wide range of pH (2-20) by comparing results from both the Kjeldahl procedure and the instrumental infrared spectroscopy method. Although the values obtained by the Z methods differed at certain pHs (< pH 3 and > pH 9), the milkoscan still offers a rapid approach for the investigation of grain protein solubility. SRA

1500

Patki (PE) and Arya (SS). **Studies on development and storage stability of instant dhals.** *Indian Food Packer* 48(3); 1994; 31-39

Bengalgram (*Cicer arietinum*), blackgram (*Phaseolus mungo*) and redgram (*Cajanus cajan*) dhal flakes were prepared by soaking in NaCl and carbonate sol., cooking in NaCl and carbonate sol., cooking under 51 psi steam pressure, conditioning to 32-35% moisture, flaking and drying to 5% moisture, flaking and drying to 5% moisture at 100°C. Flaked dhals equilibrated to 2.1-2.3, 5.2-5.8, 8.8-9.8, 14.1-15.3% moisture at 0.0, 0.33, 0.57 and 0.73 a_W. Flaked dhals reconstituted within 3 min when mixed with hot water. Flaked dhals were highly susceptible to autoxidation of lipids and developed off-flavours within 3 months at 37°C when stored in polypropylene (PP) and paper-Al foil-poly-ethylene (PFP) laminated pouches. On spicing, flaked dhals remained stable for 1 yr in PFP laminate and for 9 months in PP pouches at 37°C. Spiced and flaked dhals were acceptable to 84-98% of the consumers. AA

Faba beans

1501

Helsper (JPFG), Hoogendijk (JM), Norel (Avan) and Burger (M-K). **Antinutritional factors in faba beans (*Vicia faba* L.) as affected by breeding toward the absence of condensed tannins.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1058-1061

The effect of genetic removal of condensed tannins (CTs) on levels of other antinutritional factors in faba beans (*V. faba* L.) was studied by comparison between partners of 6 near-isogenic pairs for trypsin inhibitor activities (TIA), concn. of lectins and pyrimidine glucosides (vicine and convicine), seed wt. and proportion of testa. Each near-isogenic pair consisted of 2 lines which were genetically almost identical, apart from the absence (tannin-free, TF) or presence (tannin-containing, TC) of CTs. Within these pairs no effect of tannin content was observed on cotyledon-bound TIA or lectin concn. Seeds of TF lines showed higher levels of pyrimidine glucosides, lower seed wt. and lower proportion of testa as compared to TC lines of the same near-isogenic pair. Methanolic extracts from testa of exclusively TC lines showed significant TIA with both porcine and bovine trypsin. This TIA was completely inhibited by 1% poly(vinylpyrrolidone). Data indicate that CTs are responsible for testa-bound TIA. Observations are discussed in relation to the consequences of breeding faba beans, free of CTs, for agricultural characteristics and nutritional quality. BV

Kidney beans

1502

Carbonaro (M), Vecchini (P) and Carnovale (E). **Protein solubility of raw and cooked beans (*Phaseolus vulgaris*): role of the basic residues.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1169-1175

Solubility of proteins from 2 var. (Cannellini and Borlotti) of raw and cooked kidney beans (*Phaseolus vulgaris*) was examined. Proteins were extracted in the pH range 1-13, using 0.5M HCl or NaOH to adjust the pH, with water, 0.1 or 0.5M NaCl. Proteins were least soluble at pH 4. Extracting with 0.5M NaCl rather than water increased solubility of proteins in the pH range 2-7. Cooking beans reduced the solubility of proteins, in water and NaCl, below pH 10. Increasing the protein extraction time for cooked beans from 1 to 24 h showed that the higher the pH, the higher the rate of protein solubilization. Max. solubility of proteins from cooked beans was observed in 0.8M urea at pH 7.5. Chemical modifications of the basic protein residues on protein solubility was also studied. Lysine residues were acetylated or succinylated and arginine residues were treated with phenylglyoxal. All treatments increased protein solubility in water. Succinylation increased protein solubilization from cooked beans. Proteins water extracted at pH 6.5 from cooked and raw beans were characterized using SDS-PAGE and ultracentrifugation. Proteins from cooked beans showed greater dissociation than those from raw beans; dissociation was increased at an extraction pH of 12. An involvement of basic residues in the association-dissociation of raw and cooked bean proteins is suggested. BV

Peas

1503

Pawar (VN), Gunjal (BB), Ingle (UM) and Ghatge (UM). **Studies on the varietal differences in some physico-chemical characteristics and quality of frozen peas (*Pisum sativum* L.).** *Indian Food Packer* 48(4); 1994; 5-16

Cylindrical pea pods of 4 cv., viz. Early Badger, Bonneville, Khaparkheda and P-388-1, which were light green in colour and without wrinkles were selected. Pod wt., grain wt., and husk wt. per pod were found to be highest for Early badger and lower for Khaparkheda. Blanching time for pea cv. ranged between 1 1/2 and 2 1/2 min in hot water and ammonium bicarbonate sol. (0.2%, w/v) at 97.5°C temp. Blanched peas were frozen in air blast freezer (-30°C) and stored in deep freezer (-20°C) for 4 1/2 months. The % loss of ascorbic acid and retention of total chlorophyll were more in peas blanched with ammonium bicarbonate sol. than in hot water. Max. retention of ascorbic acid was observed in case of Bonneville followed by Early Badger, Khaparkheda and P-388-1. Blanching in ammonium bicarbonate sol. reduced the loss of total chlorophyll better than hot water blanching. Decline in % moisture, ash, ascorbic acid and total chlorophyll was relatively less during freezing than blanching. Sensory quality of Early Badger, Bonneville and P-388-1, being comparable, was significantly superior to Khaparkheda. AA

OILSEEDS AND NUTS

Cashew nuts

1504

Muroi (H), Kubo (A) and Kubo (I). **Antimicrobial activity of cashew apple flavor compounds.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1106-1109

Antimicrobial activity of the 10 most abundant flavour compounds of cashew apple (*Anacardium occidentale*), were tested. Most of them exhibited some activity against one of 14 microorganisms [yeasts, bacteria and fungi]. (E)-2-Hexenal showed activity against all the microorganisms tested, including Gram-negative bacteria. Antibacterial activity of indole against Escherichia coli was enhanced 4-fold by combining it with a sublethal amount of (E)-2-hexenal. The min inhibitory concn. of this combination was found to be bactericidal by the time-kill curve method. BV

Groundnuts

1505

Tamilselvan (C) and Sundararajan (R). **Terminal residues of metolachlor in groundnut (*Arachis hypogaea*), soybean (*Glycine max*) and onion (*Allium cepa*).** *Indian Journal of Agricultural Sciences* 64(7); 1994; 495-497

Metolachlor, a pre-emergence herbicide was sprayed at 1.0, 1.5 and 2.0 kg ai/ha 3 days after sowing groundnut, soybean and onion. Residue of metolachlor was not detected in groundnut kernel and soybean seed at harvest but onion bulb contained 0.01 and 0.06 mg/kg at the application dosage of 1.0 and 2.0 kg ai/ha respectively. KAR

Safflowers

1506

Joseph (A) and Dikshit (M). **Effect of irradiation on the proteinase inhibitor activity and digestibility (in vitro) of safflower oilcake.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 935-937

Trypsin and chymotrypsin inhibitor activities of safflower oilcake (SOC) were studied before and after irradiation. Samples of SOC were exposed to doses ranging from 7 Gy to 10 kGy. The trypsin inhibitor is inactivated at 42 Gy, whereas the chymotrypsin inhibitor remains active, even at the much higher dose of 10 kGy. The *in vitro* digestibility values also showed a significant improvement after irradiation. Exposure to a low dose of 42 Gy is sufficient to improve the nutritional value of SOC. BV

Soybeans

Soy products

1507

Arvind Kumar, Mittal (SK) and Singh (G). **Chemical characteristics of some by-products of soy industry.** *Beverage and Food World* 21(4); 1994; 30-31

Soy residue (SR) without hulls - a by-product of soy processing industry contained the highest amounts of protein (38.73%), fat (19.13%) and reducing sugars (2.37%) and lowest amount of crude fibre (CF), carbohydrates, total acid (TA) and acid insoluble ash (AIA), Ca, P, acid detergent fibre (ADF) and neutral detergent fibre (NDF). Hulls on the other hand exhibited max. contents of CF, carbohydrates, TA, AIA, Ca, P, ADF and NDF. SR without hulls exhibited more non-enzymatic browning than the other preparations. BV

TUBERS AND VEGETABLES

Onions

1508

Sharma (PK) and Nirankar Nath. **Effect of ambient storage and sprouting on physico-chemical and dehydration characteristics of onion cultivars.** *Beverage and Food World* 21(4); 1994; 15-16

Storage characteristics of 10 onion var. sprouted during 6 months at 30 plus or minus 3^{o}C, 40 - 80% RH, and dehydration characteristics of sprouted onion were investigated. Total wt. loss of onion ranged from 25% (white var.) to 80% (Red var.), av. loss of bulb wt. was 8.4-44.3% and increase in pyruvic acid content was 30.8-293.1%. Sprouting reduced during storage, but shrinkage and dehydration ratio increased by 9.6-30.6 and 1.2-23.7% respectively. Lower storage losses in Pusa white round, Pusa white flat and Pusa red var. indicated that their storage characteristics under ambient conditions were superior to those of the other 7 var. SRA

1509

Goswami (SN). **Production and price behaviour of potato (*Solanum tuberosum*) in Khasi hills region of Meghalaya.** *Indian Journal of Agricultural Sciences* 64(7); 1994; 468-473

Cyclic variation in the production and price of potato was determined by collecting data for 24 yr. (1964-65 to 1987-88) with Khasi hills of Meghalaya State, India. Fourier and correlogram analysis showed that in production and prices regular cycles of a given length appeared and they did not persist in uniform manner. Amplitude of the swing in the price cycle was larger than that in the production cycle. Variation in production and price of potato was lower in recent yr. (1986-87 and 1987-88) than in early yr. (1964-65 and 1966-67). KAR

1510

Sanchez (F-A), Laveda (F) and Garcia (C-F). **Cresolase activity of potato tuber partially purified in a two-phase partition system.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1225-1228

Cresolase monophenol monooxygenase, (EC 1.14.18.1) activity from potato, extracted by 2 phase partition, was characterized. Activity was characterized by a lag period, the duration of which depended on the substrate concn., pH and presence of catalytic amounts of o-diphenols. By increasing the concn. of o-diphenols to 50mM, activation energy of the enzyme, Kcat, was increased to 4.5µM. A mechanism is proposed which explains the loss of monophenol monooxygenase activity usually occurring during purification. AA

1511

Sanchez (Ferrer-A), Laveda (F) and Garcia (C-F). **Partial purification of soluble potato polyphenol oxidase by partitioning in an aqueous two-phase system.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1219-1224

1512

Klingspohn (U), Bader (J), Kruse (B), Vijai Kishore, (P), Schuegerl (K), Kracke (Helm-HA), Likidis (Z). **Utilization of potato pulp from potato starch processing.** *Process Biochemistry* 28(2); 1993; 91-98

Potato pulp consisting of pectins, starch, cellulose and hemicellulose was separated by treatment with dilute sulphuric acid into pectins, starch, cellulose and hemicellulose. Pectins and starch were separated by fractional precipitation with methanol or acetone. The pulp residue (PR) consisting of hemicellulose and cellulose was enzymically converted to glucose and xylose and fermented by *Pachysolen tannophilus* to produce ethanol. The PR and the residue of the enzymic decomposition (RES) were used as substrates for enzyme production by *Trichoderma reesei* Rut C30 and MGC 77 in batch and continuous cultures. The highest specific enzyme activities (6.1 U mg^{-1} avicelase, 23.4 U mg^{-1} carboxymethylcellulase, CMCase and 66.8 U mg^{-1} xylanase) and productivities (8.9 U l^{-1} h^{-1} avicelase, 34.3 U l^{-1} h^{-1} CMCase and 97.8 u l^{-1} h^{-1} xylanase) were obtained with RES in batch culture. The enzyme mixture in the cultivation medium was concentrated by ultrafiltration membrane treatment and diafiltration. Product quality was comparable with commercially available cellulases. The economy of the process was mainly influenced by utilization of pectins, starch and enzymes. Ethanol production from the hydrolysate of cellulose/hemicellulose was not economic because of the low sugar concn. in the hydrolysate. AA

1513

Sandhu (KS) and Bawa (AS). **Requirements for quality potato chips - an overview.** *Indian Food Industry* 12(4); 1993; 47-50

Describes the required quality factors for potato chips which fall into 3 major groups namely (1) raw materials which include potato size and shape, peel, appearance, sp. gr., frying time, colour, sugar content, flavour, blisters, oil/fat, salt and other additives; (2) unit operations and (3) packaging technology. CSA

Sweet potatoes

1514

Chen (BH) and Chen (YY). **Stability of chlorophylls and carotenoids in sweet potato leaves during microwave cooking.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1315-1320

The effects of microwave cooking on stability of chlorophylls and carotenoids in sweet potato leaves [eaten as a green vegetable in Taiwan] were studied. Each cooking treatment was conducted at 2450 MHz with an output power of 700 W for 0, 2, 4 or 8 min (in duplicate). Chlorophylls and carotenoids were analysed by HPLC with photodiode array detection. In most cases the content of each pigment decreased with increasing heating time. Chlorophylls and epoxy-containing carotenoids were most susceptible to heat loss. Pigments formed during microwave cooking included chl *b* isomer, chl *a* isomer I, chl *a* isomer II, pheophytin *b*, pheophytin *a*, pyropheophytin *a*, cis-neochrome and 2 lutein dehydration products, 3,4-didehydro-β,epsilon- caroten-3'-ol and 3',4'- didehydro-β,β -caroten- 3-ol. AA

Vegetables

1515

Sashi Prabhu, Banerjee (AK), Saraswat (RK) and Surjeet Singh. **Studies on preparation of commercially feasible mixed vegetables soup with nutritive value.** *Indian Food Packer* 48(3); 1994; 19-24

In the comparative study of various ready-to-serve soup combinations on the maintenance of colours, desirable sensory quality and nutritive value, recipe with tomato pulp (74.4%), pea grains (4.8%), beans shredded (4.8%), carrot paste (9.5%), sugar (2.5%), salt (1.5%), ginger extract (1%), black pepper powder (0.3%) and cumin powder (0.3%) was rated as best having secured 71.75 to 88.75% marks while recipe with tomato pulp (48.8%), carrot paste (48.8%), sugar (1.2%) and salt (1.2%) as the most inferior having secured only 48.0 - 63.75% marks, after 6 months of storage. GS

1516

Wintoch (H), Morales (A), Duque (C) and Schreier (P). **(*R*)-(-)-(*E*)- 2,6- dimethyl -3,7-octadiene- 2,6-diol 6-O-β-D- gluco pyranoside : natural precursor of hotrienol from lulo fruit (*Solanum vestissimum* D.) peelings.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1311-1314

A glycosidic fraction was obtained from a methanolic extract of lulo (*S. vestissimum* D.) peelings by Amberlite XAD-2 adsorption and methanol elution. Using preseparation by rotation locular countercurrent chromatography, subsequent acetylation and liquid chromatographic purification, a glycoside was isolated in pure form whose structure was elucidated by desorption chemical ionization-MS and NMR analyses to be the 6-O-linked beta-D-glucopyranoside of (R)-(-)-(E)-2,6-dimethyl-3,7-octadiene-2,6-diol. AA

Leafy vegetables

1517

Dewanji (A). **Amino acid composition of leaf proteins extracted from some aquatic weeds.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1232-1236

Chemical composition and amino acid profile of leaf protein extracted from 5 aquatic weeds (*Alternanthera philoxeroides*, *Azolla pinnata*, *Lemna minor*, *Limnanthemum cristatum* and *Pistia stratiotes*), were investigated. The N content in the leaf proteins ranged from 6.1 to 8.7%, β-carotene levels varied from 462.5 to 674.7 μg/g and total polyphenols ranged from 1.3 to 2.9%. There were no large differences in the amino acid composition of the 5 samples, suggesting that protein of a uniform composition could be extracted from aquatic plants. Levels of essential amino acids in the leaf proteins compared favourably with FAO reference patterns and chick requirements, indicating that leaf protein extracted from unwanted aquatic plants could be used for food/feed purposes. Even the fibrous by-product, left after the extraction of aquatic leaf proteins, having 2.1-3.2% N and low nitrate contents (0.23-0.65%) could be utilized as an additional feed for ruminants. AA

FRUITS

1518

Sahni (CK), Khurdiya (DS) and Dalal (MA). **Studies on physico-chemical characteristics of certain fruits.** *Indian Food Packer* 48(3); 1994; 5-9

Juice % worked out in 5 fruits viz. mango (Dashehari), apple (Royal delicious), pineapple, plum (Santarosa), and orange (Santra) varied from fruit to fruit, depending on preparatory losses and extraction methods. Max. juice yield was in plum followed by apple, orange and pineapple. Juice content in apple was 58.10%. Yield of orange juice, pineapple juice and mango pulp was around 40%. Mango juice had the max. TSS (20°B) followed by plum, apple, orange and pineapple (9°B). Highest acidity (1.89%) was in plum followed by pineapple, orange, apple and mango (0.25%). Brix-acid ratio was highest (80) in mango and least (8.4) in plum. Mango and orange fruits had appreciable amount of total carotenoids, which other fruits lacked. GS

1519

Mahadeviah (M), Sheshadri (KS), Gowramma (RV) and Crown (JK). **The colour deterioration of some processed fruit products packed in different packaging materials during storage.** *Indian Food Packer* 48(4); 1994; 23-28

Colour variation in mango juice, mango pulp, banana pulp and pineapple slices packed in flexible laminate pouches, glass jars and cans were studied and methods to improve the colour retention were evaluated. The colours of the fruit products was more brownish in flexible pouches and moderately brownish in glass jars as compared to tin plate cans. Hydroxymethyl furfural was slightly less in pouches and glass jars as compared to cans. Loss of carotenoid pigments was more in flexible pouches than in other containers. GS

1520

Qing (W-N) and Eads (TM). **Liquid-phase composition of intact fruit tissue measured by high-resolution proton NMR.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1026-1034

High-resolution -1H NMR spectra were obtained for intact fruit (grape, banana and apple) tissues. Liquid-phase component line widths showed field-dependent broadening due to magnetic susceptibility effects; the effect was larger in more physically heterogeneous tissues (apple > banana > grape). Magic angle spinning reduced susceptibility broadening, while water peak suppression increased dynamic range, enabling detection of components at levels of < 0.01% of fresh wt. Water, glucose, fructose, sucrose, organic acids (malic, citric, tartaric) and total fatty acyl lipids were quantified. Longitudinal relaxation times of nonexchangeable glucose protons were measured *in situ* in banana and were dominated by intra- and intermolecular homonuclear dipolar interactions. This is similar to the situation *in vitro*. Rotational motions of water sugar molecules within fruit appeared to be relatively unhindered. The combined results have implications for nondestructive analysis of heterogeneous materials and for design of new devices for quality assessment, laboratory analysis and process monitoring. AA

1521

Gergova (K), Petrov (N), Butuzova (L), Minkova (V) and Isaeva (L). **Evolution of the active surface of carbons produced from various raw materials by steam pyrolysis/activation.** *Journal of Chemical Technology and Biotechnology* 58(4); 1993; 321-330

A 1 step pyrolysis/steam activation was used to produce activated carbons from apricot stones, nuts, coconuts, almond shells and grape seeds, and Bulgarian lignite. Evolution of the active surface of the carbons was investigated. Results indicate that the adsorption properties of activated carbons were dependent on treatment temp., soak time and the raw materials. BV

1522

Davis (S). **Ripe for the picking.** *Prepared Foods* 162(5); 1993; 87-88

New products introduced in the fruit and vegetable products category in the US in 1992 are described. 276 items were launched. 15% of the items were fresh fruit and vegetable products. Aspects considered include: nutritional aspects of fruits and vegetables; combination packs of ready-to-eat vegetables and salads; microwaveable mixes of vegetables; dried fruit snacks; mini bananas; canned vegetables for use on pizza; and new-style beans. BV

Apples

1523

Mahajan (BVC) and Chopra (SK). **Studies on the storage behaviour of apple packed with ethylene absorbents.** *Indian Food Packer* 48(3); 1994; 11-18

The effect of different absorbents on the ethylene evolution, respiration rate of apple fruits and their storage behaviour in the cold storage were studied. Ethylene evolution and respiration rate was low initially, increased steadily to reach a peak value between 60 and 90 days of storage and then declined gradually towards the end of storage. Fruits packed with the sachets of Purafil (an ethylene absorbent) delayed the ethylene evolution and respiration rates upto 90 days of storage. GS

1524

Drake (SR). **Short-term controlled atmosphere storage improved quality of several apple cultivars.** *Journal of the American Society for Horticultural Science* 118(4); 1993; 486-489

Controlled atm. (CA) storage for 30 or 60 days reduced quality losses for 'Jonagold' (J), 'Golden delicious' (GD), 'Delicious' (D), 'Granny Smith' (GS), and 'Fuji' (F) apples. After 30 days J and GD from CA storage were firmer, had higher acidity and were less yellow than apples from regular atm. (RA) storage. D and GS were firmer after 60 days of CA storage than fruit from RA. In addition GS from CA had more acid (0.80%) and were greener than apples from RA. After ambient storage for 8 days, J, GD and GS apples retained a freshly harvested apple colour of more green and less yellow development when stored in CA rather than RA. In F apples, the treatments had no effect except for improved acid retention if stored in CA. A combination of 30 days CA followed by 30 days RA produced J, GD and D that were superior to apples from 60 days RA. SRA

1525

Burmeister (DM) and Dilley (DR). **Characterization of Mg^{2+}**-induced bitter pit-like symptoms on apples: a model system to study bitter pit initiation and development. *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1203--1207

Vacuum infiltration of $MgCl_2$ solutions into intact apples induces bitter pit-like symptoms [Mg^{2+}-induced pits (MgIP)]. Including Ca^{2+} in the infiltration media prevents MgIP. Golden Delicious apples were infiltrated with various concn. of Ca^{2+} and Mg^{2+} with and without Ca^{2+}-affecting reagents or other cations. Including trifluoperazine with Mg^{2+} produced more pitting than Mg^{2+} alone. Verapamil and nefedipine had no effect on MgIP or its attenuation by Ca^{2+}. Cyclopiazonic acid attenuated MgIP. Ethylene glycol bis(β-aminoethyl ether)-*N,N,N',N'*-tetraacetic acid and 2,3,5-triiodobenzoic acid attenuated MgIP. Cycloheximide and actinomycin D inhibited MgIP, while puromycin had no effect. Heating fruits at 38°C prior to infiltrating fruits with $MgCl^2$ attenuated MgIP. Ba^{2+}, La^{3+}, Co^{2+} and Sr^{2+} at 20.0mM prevented MgIP (induced by 0.18M Mg^{2+}). Ca^{2+} (3.0mM) included with 0.18M Mg^{2+} inhibited MgIP 50%. K^+ and Na^+ partially inhibited MgIP. Treatments affecting calcium homeostasis or cellular metabolism can alter MgIP development. It is concluded that MgIP may be a useful tool to understanding natural bitter pit development. AA

Banana

1526

Ramana (SV) and Jayaraman (KS). **A method to evaluate degree of ripeness of banana.** *Indian Food Packer* 48(4); 1994; 17-22

The simple analytical method for determining the degree of ripeness of banana involves analysis of comminuted pulp samples for total solids by drying and total soluble solids by refractometer. The difference between these values in naturally ripened fruits before a loss of 5% wt. was in the range of 15.22 to 1.01% at ambient conditions (25-28°C; 60-65% RH). The method can assist in judging the ripeness of banana intended for trade. Banana exposed to ethylene gas for 24 h showed no rapid ripening changes and those exposed for longer periods were spoiled due to rapid condensation of moisture. AA

1527

Qing (X-N) and Eads (TM). **Analysis by proton NMR of changes in liquid-phase and solid-phase components during ripening of banana.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1035-1040

Changes during ripening in solid-phase and liquid-phase components of intact banana tissue (pulp) were monitored by NMR. Solid-selective cross-relaxation NMR showed that rigid components, dominated by starch, decreased from 20% of fresh wt. at the mature green stage to 2.0% at the ripe yellow stage. Transverse relaxation measurements and wide-line NMR verified that starch in banana is as rigid as in isolated hydrated granules from banana. A less rigid component was also detected. Liquid-phase components were measured by low-speed magic angle spinning NMR. Resonances of water, sucrose, fructose, glucose, fatty acyl chains of mobile lipids and organic acids were easily detected. During ripening, sucrose concn. increased from 2.2 to 8.5% fresh wt., fructose from 0.5 to 5.3% and glucose from 0.4 to 4.3%. Starch conversion to sugars was also quantified. NMR analysis was conducted without tissue disruption, separations, chemical treatment or other spectrometry. The potential applications of NMR for fruit and fruit product quality assessment and processing applications are discussed. AA

Carambola

1528

Ghazali (HM), Ming (TC) and Hashim (DM). **Effect of microwave heating on the storage and properties of starfruit honey.** *ASEAN Food Journal* 9(1); 1994; 30-35

Microwave energy was used to heat-treat the starfruit (*Averrhoa carambola* L.) honey at 71°C. Untreated honey was used as the control. The honeys were then stored at 4°C or room temp. (28 plus or minus 2°C). Physical and chemical properties were monitored over 16 wks. Spoilage due to fermentation occurred in unheated honey stored at ambient temp., and granulated when stored at 4°C. Both heated and unheated honeys darkened during storage at room temp. Heating lowered diastase activity and yeast count. This method is regarded as a short term or temporary measure to protect high moisture content honey from rapid quality deterioration. SRA

Cherries

1529

Chandra (A), Nair (MS) and Iezzoni (AF). **Isolation and stabilization of anthocyanins from tart cherries (*Prunus cerasus* L.).** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1062-1065

Isolation of anthocyanins from tart cherries (Montmorency or English Morello cv. and 3 hybrids) is presented. Juice is centrifuged and applied to a column of XAD-2 resin washed in ethanol. The column is washed with water until the colourless washings are at pH 7.0. Absorbed material is then eluted with ethanol. The ethanol eluent is concentrated under vacuum and lyophilized. Quantity of pigments isolated depended upon cherry cv. and juice type, i.e. conc. or single strength. Stability of anthocyanin powders obtained by this method and aqueous solutions prepared from them, as well as stability of anthocyanins in juice, was studied. Phosphoric acid, maltodextrin or α- or β-cyclodextrin was added to stabilize anthocyanins. Juices stored for 12 wk with β-cyclodextrin contained 49, 37, 32, 69 and 55% of the original anthocyanin levels, respectively, for Montmorency, English Morello and the 3 hybrids. Juices stored without dextrins had lower levels of anthocyanins. Anthocyanin powders with added dextrins were stable at room temp. for 12 wk. Extracts stored as powders showed less degradation than those in sol. AA

Grapefruits

1530

McDonald (RE), McCollum (TG) and Nordby (HE). **Temperature conditioning and surface treatments of grape fruit after expression of chilling injury and gas diffusion.** *Journal of the American Society for Horticultural Science* 118(4); 1993; 490-496

'Marsh' Grapefruit (*Citrus paradisi* Macf.) were temp. conditioned (7 days at 15°C), wiped with hexane, treated with squalene, squalane or safflower oil (all 10% in hexane), or waxed with a commercial fruit wax (Flavorseal) to determine their effects on wt. loss, chilling injury (CI) symptoms on the peel, and gas exchange. Following 3 wks of storage at 5°C, wiping fruit with hexane resulted in a significant decrease in wt. loss, but not CI. Temp. conditioning and Flavorseal independently inhibited wt. loss and CI development. Squalene inhibited CI development, but not wt. loss. Chilling injury on fruit treated with squalene or Flavorseal was similar in appearance, but significantly less common than that on nontreated fruit. Grapefruit peel accounted for 92% of the gas diffusion of fruit, and resistance coefficients for peel and whole fruit were similar. Less ethane diffused into fruit that were: temp.-conditioned compared with nonconditioned, hexane wiped compared with nonhexane-wiped, and squalene-treated compared with nonsqualene treated fruit. Ethane influx was significantly restricted into squalane- and squalane-treated fruit compared with Flavorseal- or safflower oil-treated fruit. Oxygen and CO_2 influx was significantly reduced by Flavorseal, safflower oil, squalene, and squalane. Squalane was the most restrictive of ethylene efflux followed by safflower oil, squalene, and Flavorseal. All of these surface treatments are known to reduce CI on grapefruit. These data indicate that water loss is less important to the development of CI than has been previously suggested, and that the beneficial effects of squalene are not the result of an inhibition of water loss. Permeability of grapefruit peel to gases other than H_2O vapor may also influence the expression of CI. AA

Kinnow mandarin

1531

Khurdiya (DS) and Lotha (RE). **Kinnow mandarin storage and processing - a review.** *Indian Food Packer* 48(4); 1994; 33-49

Effect of storage treatments, processing and preservation conditions on the physico-chemical characteristics like shelf-life, juice content, peel content, pomace, TSS, pH, acidity, ascorbic acid, sugars, carotenoids, pectin, density, viscosity, cloud, colour, citrus peel oil of Kinnow mandarin fruit are reviewed. GS

Sapota

1532

Abu Bakar (F) and Abdul-Karim (MNB). **Chemical treatments for microbial control on sapota.** *ASEAN Food Journal* 9(1); 1994; 42-43

Mature sapota ((ciku) *Achras sapota* L., *Manilkara achras* L.) were treated with (1) dry sponging, (2) water, (3) benlate (methyl N-(1-butylcarbomoyl) at 0.2 mg/kg, (4) difilotan (N-(1, 1,2,2-tetrachloroethyl thio) cyclohexe-ene-1,2 dicarboximide) at 2 mg/kg, and (5) captan (1,2,3,6-tetrahydro-N-trichloromethylthiopthalimide) at 15 mg/kg to prevent bacterial population. The chemical treatments supressed the microbial population. Dry sponging and water gave some protection but less than chemical treatments. Among the chemical treatments, benlate seemed to be the most effective with respect to its potency and cost. SRA

CONFECTIONERY, STARCH AND SUGAR

Confectionery

1533

Davis (S). **New candy geared for the 'sour-tooth'.** *Prepared Foods* 162(5); 1993; 69-70

New product introduced (22%) in the sugar confectionery category in the US in 1992 are discussed. Aspects considered include: sour flavoured candies; tongue-colouring confectionery; character-theme candies; and chocolate products. BV

1534

Anon. **Nuts about almonds.** *Prepared Foods* 162(6); 1993; 62

Use of almonds in a variety of sugar confectionery products is discussed. Aspects discussed include: diced and whole almonds; almonds in sugar-free candy; maintaining almond quality; grading of almonds; and quality assurance. BV

Chocolates

1535

Jana (AH) and Thakar (PN). **Fat bloom in chocolates and confectionery coatings - a review.** *Indian Food Industry* 12(4); 1993; 33-39

The characteristics of fat bloom, a white or greyish haze occurring during the storage of chocolate; resistance measurement of the bloom; causative factors and mechanistic considerations for the occurrence of fat blooms such as migration of cocoa-fat crystals, decomposition into mixed crystals, polymorphic transformation, development of stress, latent crystal heat changes, improper tempering and rapid cooling, use of incompatible fats, type of chocolate products and the preventive measures undertaken to combat fat bloom are by (i) physical means (temp. adaptation of the centres, tempering, cooling of the enrobed pieces); (ii) chemical means (emulsifiers, seed materials, fat and oil, speciality fats, whey powders, selective hydrogenation of fats) are the aspects reviewed in this article. 57 references. CSA

Starch

1536

Sarmidi (MR) and Barker (PE). **Saccharification of modified starch to maltose in a continuous rotating annular chromatograph (CRAC).** *Journal of Chemical Technology and Biotechnology* 57(3); 1993; 229-235

Simultaneous biochemical reaction and separation was performed in a continuous rotating annular chromatograph (CRAC) for enzymic saccharification of liquefied starch to maltose. The enzyme was a thermostable, exo-acting, recombinant *Bacillus stearothermophilus* maltogenic alpha-amylase. A simple optimization procedure was used to regulate vol. and concn. in the CRAC. With potato starch as substrate, maltose conversions of up to 79% were achieved at feed flow rates of up to 400 cm^3 h^{-1} and 15.5% w/v concn. Resolution between maltose and dextrins was 0.92. AA

Sugar

Sugarcane

1537

Patil (JP), Jadhav (HD), Wandre (SS) and Hasabnis (AB). **Screening of different sugarcane varieties for quality jaggery and storability.** *Indian Sugar* 44(2); 1994; 123-127

Out of 11 sugarcane var. (COC 671, COM 7129, CO 7527, CO 7628, CO 7634, COM 7704, COM 7712, CO 7219, CO 419, CO 775, CO 740) raised in identical conditions, at Regional Sugarcane and Jaggery Research Station, Kolhapur, India, CO 775 and promising lines COC 671, CO 7527, CO 7634 registered statisfactory quality of juice, jaggery and also their storage stability. SRA

1538

Kathiresan (G), Narayanasamy (MR) and Veerabadran (V). **Post-harvest deterioration in weight and juice quality of cane varieties.** *Madras Agricultural Journal* 80(10); 1993; 547-551

Harvested canes of sugarcane var. viz. CoC 85061 and CoC 671 were stalled in open sun light, under tree shade and in open sunlight covered with cane trash. Loss in cane wt. and juice quality was estimated at 24 h interval. The cane stored under tree shade and stored upto 48 h recorded significantly min. loss of cane wt. and juice quality. The CoC 85061 recorded lesser loss in cane wt., sucrose content, purity and commercial cane sugar and higher gain in reducing sugar content. AA

BAKERY PRODUCTS

1539

Dornblaser (L). **Pyramid power lures bakers.** *Prepared Foods* 162(5); 1993; 48, 51-52

New bakery products developed in the US in 1992 is discussed, with respect to approval of the Food Guide Pyramid, which recommends that consumers eat 6-11 portions of breads, cereals, rice and pasta daily. Total bakery product introduced were 1508. Aspects discussed include: bread products with reduced-fat; reduced-fat cookies; bread made with spelt; ethnic foods (Italian breads); shortbreads; and character-theme products. BV

1540

Davis (S). **New snacks capture healthy market.** *Prepared Foods* 162(5); 1993; 101-102

New snack foods products introduced in the US in 1992 are described. Aspects considered include: line extensions (healthier versions of existing product lines); low sodium, low fat flavoured crisps; pretzels containing honey, sesame seeds and wholewheat flour; sourdough pretzels; crosses between tortillas and crisps; thin tortilla chips; and meat snacks. BV

Cakes

1541

Davis (S). **New ingredients make baking a piece of cake.** *Prepared Foods* 162(5); 1993; 55

Development of new dried mixes (250) for bakery products in the US in 1992 is described. Aspects considered include: bread mixes; bread mixes for bread machines; muffin mixes containing fat substitutes; and cookie mixes to be used as pie crusts. BV

Chapaties

1542

Anita Rawat, Singh (G) and Mital (BK). **Microbiological characteristics of soy fortified chapaties.** *Beverage and Food World* 21(4); 1994; 22-23

Microbiological characteristics of dough and chapaties made by soy fortification of whole wheat flour (WWF) is reported. Dough made from WWF exhibited greater total plate count, proteolytic count and coliform count than the dough made from blend of WWF and defatted soy flour in ratio of 90:10. These counts increased considerably during storage of dough samples at ambient temp. of 22 plus or minus 1°C, whereas their growth was restricted at 4 plus or minus 1°C. There was marginal increase in total bags at ambient temp. for 4 h. Baking of chapaties totally inhibited growth of coliforms. SRA

Pasta

1543

Davis (S). **Pasta-mania keeps side dish category cookin'.** *Prepared Foods* 162(5); 1993; 97-98

New side dish products introduced in the US in 1992 are described. 560 new items were introduced. Aspects considered include: pasta products; refrigerated pasta side dishes; potato fries; flavoured rice products; and ethnic rice dishes. BV

MILK AND DAIRY PRODUCTS

1544

Prajapati (JP), Jana (AH) and Patel (HG). **Application of lecithin in dairy industry - a review.** *Beverage and Food World* 21(4); 1994; 24-29

Aspects covered in this review are composition of lecithin, mode of action of lecithin, functional properties of lecithin, application in dairy products, reconstituted milk and cream, instant powders (whole milk powder, caseinates), fermented milk and milk products (fermented milks, dahi and yoghurt, cheese), fat-rich products (whipping cream, coffee cream, butter/recombined butter, margarine, low-calorie spreads), sterilized whole milk concentrates, ice cream and chocolate courverture, coffee whiteners and dietetic products. 63 references. SRA

1545

Rao (VM). **Productivity improvement at Kolhapur Milk Union (Maharashtra).** *Indian Dairyman* 46(7); 1994; 377-383

1546

Singh (AJ), Sain (I) and Joshi (AS). **Prospects for dairying in Punjab.** *Indian Dairyman* 46(7); 1994; 417-420

Trends in contribution of dairying towards farm income in Punjab, India; pattern of disposal of milk for different size categories of farms and zones; pattern of processed products over time; performance of milk cooperative societies over period; and margins of the milk plants over costs for different products are analysed. GS

1547

Friedman (M) and Dornblaser (L). **Creativity spurs dairy category growth.** *Prepared Foods* 162(5); 1993; 77-78

New product introduced in the dairy products category in the US in 1992 are described. A 19% increase in the number of new products was observed. Trends included increases in low fat and healthy products. Aspects covered include: speciality milks (low-cholesterol milk, lactose-reduced milk); blended cheeses; non-fat cheeses; fat free dairy products; yoghurts aimed for children; ice cream mixed with cookie dough; and yoghurt and fruit juice drinks. BV

Milk

1548

Singh (AJ) and Singh (RP). **Economic aspects of milk marketing in Punjab.** *Indian Dairyman* 46(7); 1994; 403-410

Pattern of milk production, consumption and marketed surplus; disposal of marketed surplus of milk on different size categories of farms; marketing costs and margins of different agencies for different channels; economics of milk production; and pricing and distribution of milk are evaluated. GS

1549

Sapra (RK) and Bindal (MP). **Recombined milk prepared with ghee in comparison to butter-oil. I. Reconstitution.** *Indian Journal of Animal Science* 64(7); 1994; 770-773

The problems of fat separation and unacceptable flavour encountered with recombined milk prepared with ghee have been successfully eliminated by modification in recombination process. The quality of ghee as judged by peroxide value (PV) and FFA level and also the quality of SMP (low heat vs high heat) had a direct effect on the quality of recombined milk. AA

Milk products

1550

Dornblaser (L). **Indulgent ways to end a meal.** *Prepared Foods* 162(5); 1993; 81

Ninety three new dessert products were introduced in the US in 1992; of those, less than 25% were low-calorie or low-fat. Dessert toppings comprised two thirds of the category. Aspects considered include: thick chocolate sauce; ice cream toppings; blue-coloured food products; and healthy refrigerated puddings. BV

Cheese

1551

Forcinio (H). **Package of the year takes microwavability to new frontier.** *Prepared Foods* 162(5); 1993; 37

A single-serve, microwaveable pouch pack for cheese toppings is described. The pouch is made of layers of polyester, PVC (for barrier) and polypropylene (for sealability and heat resistance) and contains a layer of flexible extruded polystyrene foam that prevents fingers from being burnt during handling after the product comes out of the microwave. To heat, the spout is opened and the pack is microwaved for 30-40 seconds. As the contents warm, the steam escapes through the spout. After microwaving, the consumer can fold the pouch to squeeze the contents out. The product has a 6-month shelf-life. BV

Domiati cheese

1552

El-Samragy (YA), Shehata (AE), Foda (MI) and Khorshid (MA). **Effect of salt on the production of citric acid from whey as a means for pollution control in Domiati cheese manufacture.** *Dairy, Food and Environmental Sanitation* 13(11); 1993; 638-641

The chemical oxygen demand (COD) and biological oxygen demand (BOD) of salt whey can be markedly reduced upto 77.8 and 76.3% respectively via bioconversion of whey into citric acid (CA) by *Asp. niger* CAIM 111 and CAIM 167 when the pH is adjusted to 3.5 and methanol is added at a level of 4%. Also, deproteinization of whey prior to fermentation is important to maximize the reduction of pollutant load of this by-product. Study showed that using salt whey, the by-product of the manufacture of Domiati cheese, as a substrate for the production of CA by *Asp. niger* can be considered as a possible technique for utilizing whey for a beneficial purpose as well as a pollutant load reducer. BV

Leben

1553

Jandal (JM). **Physical, chemical and biochemical studies on Leben in Salah Al-ddin province area.** *Beverage and Food World* 21(4); 1994; 11-12

The av. % of total solids, moisture, acidity, fat, protein, casein, lactose, total ash, Ca, Mg, P, Na and chloride in Leben (fermented milk product) were 13.25, 86.75, 1.16, 3.61, 2.94, 4.5, 0.89, 0.212, 0.025, 0.084, 0.121, 0.243 respectively. BV

Wheys

1554

Shilpa (Vij) and Gandhi (DN). **Whey - an alternative substrate for the production of baker's yeast.** *Indian Food Industry* 12(5); 1993; 41-43

Role of yeast in bread making, production of baker's yeast from whey and production of non-conventional baker's yeast are the aspects presented in this article. CSA

Milk proteins

1555

Britten (M) and Giroux (HJ). **Interfacial properties of milk protein-stabilized emulsions as influenced by protein concentration.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1187-1191

Interfacial area, protein load and interfacial energetics of emulsions produced from sodium caseinate (CAS) and whey protein isolate (WPI) were determined. Protein concn. in the aqueous phase varied from 0.125 to 1%. At low concn., WPI emulsions had larger interfacial areas (smaller oil droplets) than CAS emulsions. For concn. greater than 0.5% the reverse trend was observed. Protein load increased with protein concn., but levelled off at a concn. of 0.5% for WPI emulsions. From contact angle measurements on hydrated layers, interfacial interaction energy between oil droplets was calculated. As protein concn. increased, the short-range polar (AB) contribution to interaction energy became repulsive while the long-range nonpolar contribution remained attractive. The degree of orientation of the hydration layer was calculated from the AB contribution to oil droplet surface energy. Increasing protein concn. reduced water molecule orientation at the surface of oil droplets. The hydration layer of CAS-stabilized oil droplets showed a lower degree of orientation than the hydration layer of WPI-stabilized oil droplets. Results are discussed in relation to emulsion stability. AA

Whey proteins

1556

Nonaka (M), Li (C-E) and Nakai (S). **Raman spectroscopic study of thermally induced gelation of whey proteins.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1176-1181

α-Lactalbumin and β-lactoglobulin solutions (15% (w/v) in D2O, pD 6.8, 20mM NaCl) were heated at 50, 70 or 90°C for 30, 60 or 90 min. Only samples heated at 90°C formed transparent gels. The amide I' and amide III' bands of the Raman spectra implicated an increase of β-sheet structure with a simultaneous decrease of helical structure in heated α-lactalbumin, while an increase of β-sheet with a simultaneous decrease of turn structure was suggested in heated β-lactoglobulin. Changes in other regions of the Raman spectra could be interpreted as changes in disulphide conformation as well as in microenvironment around several amino acid residues, i.e. Trp, Tyr and His. These changes were observed after heating at 70 and 90°C but were more intense in gelled (90°C) than in ungelled samples and in β-lactoglobulin than in α-lactalbumin. Observations are in accord with the fact that β-lactoglobulin forms gels much more easily than α-lactalbumin. AA

MEAT AND POULTRY

1557

Lee (W-O). **Monitoring synthetic hormone residues in food: The Hongkong experience.** *ASEAN Food Journal* 9(1); 1994; 13-16

Oestrogenic hormones, both synthetic and natural, are used as anabolic agents in animal husbandry for wt. gain and feed efficiency of feedstocks. Carcinogenicity and other adverse health effects of these hormones are observed and has been banned in most countries throughout the world. The method reported comprises HPLC for the detn. of synthetic hormone residues and the use of several techniques including GC-MS, Fourier transform infrared spectrophotometry and high performance TLC for further confirmation. BV

Meat

1558

Sharma (BD), Padda (GS) and Yadav (PL). **Development of gravy base for meat curry.** *Beverage and Food World* 21(4); 1994; 7-8, 12

Development of a suitable gravy base with balanced ingredients and good storage quality is necessary for convenience and speed of curry preparation. Results of the study indicated that onion, garlic, and ginger (60:2:2) mix, tomato paste, oil, dry spices, salt, curd and maida as ingredients in the right proportion for the preparation of an acceptable gravy. The gravy could be packed alone or with meat balls in polypropylene (150 guage) pouches and stored safely for 15 days at refrigerated temp. and 90 days in frozen condition. Storage of gravy with meat balls had better shelf-life as compared to gravy alone. BV

1559

Vorster (SM), Greebe (RP) and Nortje (GL). **The incidence of *Listeria* in processed meats in South Africa.** *Journal of Food Protection* 56(2); 1993; 169-172

1560

Maijala (RL), Eerola (SH), Aho (MA) and Hirn (JA). **The effect of GDL-induced pH decrease on the formation of biogenic amines in meat.** *Journal of Food Protection* 56(2); 1993; 125-129

The effect of pH on formation of biogenic amines has been studied mainly in broths in which pH has been fixed before incubation. In the fermentation of dry sausage, pH rapidly decreases from the initial value to a certain level. Glucono-delta-lactone (GDL) was used to decrease pH in meat. 6 minced meat samples were each divided into 3 portions with 0, 0.5 or 1.0% GDL added. Samples were incubated at 20-22°C for 7 days. Amounts of biogenic amines (histamine, tyramine, putrescine, cadaverine, phenylethylamine, tryptamine, spermine and spermidine) as well as pH, aw and bacterial counts of lactic acid bacteria, faecal streptococci, coliforms and total plate count were measured. Addition of GDL resulted in a significant decrease in pH and in level of histamine and putrescine as well as in levels of faecal streptococci and coliforms, and total plate counts. Of 87 faecal streptococci, 7 *Enterococcus faecalis* strains produced tyramine. All coliforms and related strains isolated from violet red bile agar produced tyramine, putrescine and cadaverine on agar plates. The proportion of histamine-positive strains, especially *Hafnia alvei*, increased from 0 to 57% during incubation. The rate and level of pH decrease affected amine formation in meat, indicating that levels of, e.g. histamine produced could be decreased by optimizing the pH decrease during fermentation. Addition of GDL facilitates study of effects of pH decrease without interactions between the starter culture and contaminant flora. AA

1561

Teltumbade (SS), Sherikar (AT), Waskar (VS) and Sherikar (AA). **Detection of residual pencillins in meat employing *Bacillus stearothermophilus* disc assay.** *Indian Journal of Animal Science* 64(7); 1994; 774-777

Meat (117 samples) from different sources were analysed for β-lactum and other inhibiting residues. Modified method was used for screening and confirmation of β-lactum residues in buffalo and chicken meat using penicillinase enzyme. The birds treated with ampicillin trihydrate and procaine penicillin exhibited β-lactum residues in their tissues. Higher values of β-lactum and other inhibiting residues in buffalo meat (15.84%) as compared to those reported from bovines slaughtered abroad were attributable to slaughter of animals, which had probably received prolonged treatments for chronic aliments. Similarly, the excessive use of antibiotics as growth promoters and feed additives in broilers resulted in higher percentage (18.75%) of antibiotics. The present work indicates an urgency to advocate rational use of antibiotics in animals for safegaurding the human health and the enforcement of standards as important in protecting public health. AA

Beef

1562

Lourdes (B-M) and Soares (ME). **Effect of cooking on diazepam and its metabolites in liver of bulls.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 965-967

1563

Jericho (KWF), Bradley (JA), Gannon (VPJ) and Kozub (GC). **Visual demerit and microbiological evaluation of beef carcasses: methodology.** *Journal of Food Protection* 56(2); 1993; 114-119

A repeatable, automated method was developed for estimating aerobic bacterial populations on surfaces of groups of beef carcasses. 10 sample cluster sites (CS) were identified by localizing visual demerits (Canadian Streamlined Inspection System) on 200 carcasses at 1 plant. Most probable number growth units/cm^2 (MPNGU/cm^2) on hydrophobic grid membrane filters (HGMF) were assessed by an automated HGMF interpreter for excision samples from the centres of the CS. Between-sample variation of greater than 90% of the total log10 MPNGU/cm^2 variance indicated good repeatability between HGMF of the same sample and interpretations of the same HGMF. Variance component estimates indicated that there was considerable variation in MPNGU/cm^2 between carcasses and between paired adjacent samples for a CS. A statistically significant but weak association was found between the demerit scores of a CS and MPNGU at its centre. The variance component estimates will be used to estimate the sample required for future group-carcass evaluations. AA

1564

Hogue (AT), Dreesen (DW), Green (SS), Ragland (RD), James (WO), Bergeron (EA), Cook (LV), Pratt (MD), Martin (DR). **Bacteria on beef briskets and ground beef: correlation with slaughter volume and antemortem condemnation.** *Journal of Food Protection* 56(2); 1993; 110-113, 119

Aerobic plate counts of 3455 brisket and 1370 beef mince samples were examined for association with slaughter vol. in 547 US beef slaughter establishments. High vol. beef slaughter establishments control total aerobic bacteria counts on briskets and beef mince more effectively than small vol. establishments. The lower aerobic plate counts at high slaughter vol. may have resulted from uniformity of cattle slaughtered, specialization of labour, measures taken to prevent contamination and effective decontamination of carcasses in high vol. slaughter establishments. Prevalence of *Salmonella* contamination was found to be more closely associated with health of animals brought to slaughter than with conditions in slaughter establishments. Prevalence of contamination of brisket and beef mince samples with *Salmonella* was highest in calf slaughter establishments. *Salmonella* contamination on brisket samples increased as antemortem condemnation increased in establishments that slaughter calves. No association was found between *Salmonella* contamination and slaughter vol. AA

1565

Grau (FH) and Vanderlinde (PB). **Aerobic growth of *Listeria monocytogenes* on beef lean and fatty tissue: equations describing the effects of temperature and pH.** *Journal of Food Protection* 56(2); 1993; 96-101

The aerobic growth rate and duration of the lag period were determined for *L. monocytogenes* strain Murray B growing on lean beef mince and on pieces of fatty tissue. The organism grew at 0°C on lean tissue at pH greater than or equal to 6 and on fatty tissue. It failed to grow at 0°C on lean at pH 5.6 but did grow at 2.5°C. Effect of temp., between 0 and 30°C, on the growth rate on fatty tissue can be described by a modified Arrhenius equation, which accounted for 99.7% of the variance. An equation is also presented for describing the combined effect of temp. and pH on growth rate on beef lean (variance accounted for 99.5%). For lean at about pH 5.5-5.6, this equation applied between about 2.5 and 35°C; for lean of pH 6-7, it applied between about 0 and 35°C. Though the lag period increased with decrease in temp. and pH, measured lag times were more variable than generation times, and the goodness of fit of modified Arrhenius equations to lag times was relatively poored for 83-92%). AA

1566

Talaat (El-K), Yousef (AE) and Ockerman (HW). **Inactivation and attachment of *Listeria monocytogenes* on beef muscle treated with lactic acid and selected bacteriocins.** *Journal of Food Protection* 56(1); 1993; 29-33

Cubical pieces (1 cm^3) of aseptically obtained beef muscle were treated with lactic acid (2%), nisin (4 x 10^4 IU/ml) and pediocin PO2 (a bacteriocin produced by *Pediococcus acidilactici* PO2; 3.2 x 10^3 arbitrary units/ml). Treated meat was immersed for 1 min in a cell suspension of a mixture of 2 strains of *Listeria monocytogenes* and then stored for 48 h at 4°C. Meat cubes were analysed immediately after immersion in the cell suspension, then after 1, 24 and 48 h of storage. Count of *L. monocytogenes*/cube and % of attached cells were determined. Data indicated that the antimicrobial agents significantly ($P = 0.05$) decreased the count of *L. monocytogenes* during the 48-h storage by 1.7, 1.1 and 0.6 log10 cfu/6 cm^2 of meat surface for lactic acid, nisin and pediocin PO2 treatments, respectively. Lactic acid on the meat surface had both immediate and delayed listericidal action, but bacteriocins inhibited *L. monocytogenes* immediately, and had little or no delayed antilisterial effect. Percentage of *Listeria* cells attached to beef muscle significantly ($P = 0.05$) increased in the presence of lactic acid, but the value did not change significantly or slightly decreased in the presence of nisin and pediocin PO2, respectively. AA

Mutton

Goat

1567

Tahir (MA-H), Abdulla (A-HH) and Al-Jassim (AF). **Effect of castration and weight at slaughter on carcass traits and meat quality of goat.** *Indian Journal of Animal Science* 64(7); 1994; 778-782

Iraqi indigenous black male goat kids (9 castrated and 9 intact) were slaughtered at body wt. of 18.5 and 24.5 kg. Live body wt., body organ wt. and their percentages of live wt. were not affected significantly by castration except that for the per cent of head and pelt. Animals slaughtered at 24.5 kg wt. produced significantly higher ($P < 0.01$) wts. for head, feet, pelt and full alimentary tract. Castration had no significant effect on carcass wt., dressing percentage, carcass measurements, rib-eye muscle area and wt. of kidney fat, except that the wt. of caul fat in the castrated animals was heavier than that of intact males. Carcass wt. and dressing percentages were higher ($P < 0.05$) in animals slaughtered at 24.5 kg live wt. Carcass major cut wt. and percentages were not influenced by castration. Animals slaughtered at heavier wt. produced significantly heavier carcass major cuts, while their percentages of chilled carcass wt. were not influenced. Wt. of animal at slaughter did not affect taste panel evaluation of meat. Moreover, flavour, juiciness, tenderness and overall satisfaction of meat samples from castrated animals gained higher ($P < 0.01$) evaluation scores compared with that of intact male goats. AA

Sheep

Lamb

1568

Rivas (T), Herrera (A) and Arino (A). **Assessment of an excision surface sampling method for microbiological analysis of lamb liver.** *Journal of Food Protection* 56(1); 1993; 58-61

Reproducibility of an excision surface sampling method for microbiological analysis of 204 samples of spoiled and nonspoiled lamb liver was studied. The procedure consisted of removing a 5 cm^2 area from the liver (1-2 mm thick) with sterile scalpel and metal templates. Since variation was observed in thickness of the excised portions taken from different livers, all excised samples were weighed and results for microbiological analysis (aerobic plate counts at 30 and 7°C, *Enterobacteriaceae*, *Pseudomonas* and lactic acid bacteria counts) were expressed as both log cfu/cm^2 and log cfu/g. For all groups of microorganisms studied, in both spoiled and nonspoiled samples, a highly significant correlation was found ($r > 0.996$, $P < 0.0001$) between results expressed as log cfu/cm^2 and log cfu/g. AA

Pork

1569

Narasimhan Ramarathnam, Rubin (LJ) and Diosady (LL). **Studies on meat flavor. III. A novel method for trapping volatile components from uncured and cured pork.** *Journal of Agricultural and Food Chemistry* 41(6); 1993; 933-938

Volatile components from uncured (UCP) and cured pork (CP) were trapped onto a solid adsorbent (Florisil cartridge) and in an organic solvent (pentane) using the nitrogen purge-and-trap (NPT) technique. 32 compounds not previously reported were identified. Meat flavour concentrates prepared by the NPT method showed the presence of heterocyclic and phenolic constituents not detected in the aroma concentrates prepared using continuous steam distillation-extraction. Of the 26 compounds that were found only in the uncured-pork aroma concentrates, 2-methyl hexanal, tetrahydro *-cis-* 2,4-dimethyl furan, 3-propyl- 1*H*-1,2,4-triazole, 4-methyl- 1-decene, nonylcyclo propane, 5-propyl decane, 1,3- dimethoxy benzene, (1,1-dimethylethyl)-4- methoxy phenol, 3-amino-5,6-dimethyl triazolo [4,3-α] pyrazine, 2-butyl phenol and bis(2-ethylhexyl) phthalate were newly identified. Only the 2 newly identified components 2-methylcyclopentanol and 2-butyl-2-octenal were identified uniquely in the aroma concentrates of cured pork. BV

1570

Knudtson (LM) and Hartman (PA). **Enterococci in pork processing.** *Journal of Food Protection* 56(1); 1993; 6-9, 17

Numbers and species of enterococci encountered on pork carcasses during different stages in the slaughter process as well as on pork products were determined. 3 hog slaughtering plants were surveyed, each 3 times at 4 processing points. Each swine carcass was swabbed at 2 sites. Specimens were plated on KF streptococcal agar and fluorescent gentamycin-thallous-carbonate agar. Retail and spoiled pork sausage products were also examined. Isolates were speciated by using the API Rapid Strep and Baxter MicroScan Pos ID panels. Contamination levels varied between plants as the carcasses progressed down the processing line; highest counts were obtained directly before packaging in plants A and C. The highest count for plant B occurred at the first stage of sampling. More *Enterococcus faecalis* than *E. faecium* were isolated from the pork carcasses. Pork sausage results are also presented [fresh sausage samples contained the same enterococci spp. as swine carcasses; spoiled sausages contained mainly *E. faecium* with lesser amounts of *E. faecalis*]. It was concluded that enterococci are useful as an indicator of pork sanitation and to detect critical control points during processing. In some instances, high levels of enterococci were associated with spoilage of pork sausage. AA

Products

1571

Dornblaser (L). **Meat makers market deli freshness.** *Prepared Foods* 162(5); 1993; 93-94

New product introductions in the processed meat category in the US are discussed. 785 processed meat, poultry and seafood items were introduced in 1991. Aspects considered include: 'deli'-style combination meat packs; low-calorie and low-fat meats; lunchtime meat products; low-fat sausages; ready-to-cook fish; breaded seafoods; meat alternatives (vegetarian burgers); and venison and buffalo products. BV

Poultry

1572

Stavric (S) and D'Aoust (JY). **Undefined and defined bacterial preparations for the competitive exclusion of *Salmonella* in poultry - a review.** *Journal of Food Protection* 56(2); 1993; 173-180

Competitive exclusion, as a method for controlling *Salmonella* in poultry, has been studied. Under lab. conditions, undefined preparations cultured from faecal and caecal microflora have reduced the prevalence of infected chicks following exposure to a standard dose of *Salmonella*. Use of undefined cultures and the effectiveness of defined cultures are discussed, under the headings: The scope of the problem; and Competitive exclusion (Treatment with undefined mixtures and Treatment with defined cultures). It is concluded that competitive exclusion may provide a useful adjunct to help reduce *Salmonella* in poultry. Review with 103 references. CSA

1573

Abouzied (MM), Cheng (H-W), Pestka (JJ) and Smith (DM). **Lactate dehydrogenase as safe endpoint cooking indicator in poultry breast rolls: development of monoclonal antibodies and application to sandwich enzyme-linked immunosorbent assay (ELISA).** *Journal of Food Protection* 56(2); 1993; 120-124, 129

An ELISA was developed to detect lactate dehydrogenase (LDH) as a marker protein for verifying endpoint cooking of uncured poultry products. Monoclonal antibodies were prepared against chicken muscle LDH and used with rabbit polyclonal antibodies developed against turkey or chicken muscle LDH for capture and detection in the assay, respectively. Min. assay detection limits for turkey and chicken muscle LDH were 1 ng/ml. Turkey and chicken muscle LDH, but not LDH from other spp., cross reacted in the ELISA. The ELISA was further verified using extracts of turkey breast rolls processed to internal temp. between 68.3 and 72.1°C. LDH content of extracts diluted 3- to 6-fold was less than 15 ng/ml for turkey rolls processed to 70.9 and 72.1°C. At a 6-fold dilution, LDH content of extracts from rolls processed to 69.7°C was approx. 10x greater than those processed to 70.9°C. A survey of market precooked poultry products indicated assay validity with precooked turkey roast, but not turkey hams with max. internal temp. requirements of 68.3°C. Results suggested the ELISA was applicable for determining whether turkey breast rolls are processed to the required USDA endpoint temp. of 71.1°C. AA

1574

Samoon (AH) and Sahoo (J). **Mechanically deboned poultry meat: Quality aspects and its utilization by Indian meat industry.** *Indian Food Industry* 12(3); 1993; 23-26

This article briefly highlights the origin and significance of mechanically deboned poultry meat (MDPM), different models of mechanical deboners, yield and composition of MDPM, protein quality and cholesterol levels of MDPM products, MDPM vs. product development, microbial quality and shelf-life aspects of MDPM. CSA

Chickens

1575

Kondaiah (N), Anjaneyulu (ASR), Lakshmanan (V), Singh (RP) and Panda (B). **Meat and byproduct yield from different commercial classes of chicken.** *Indian Journal of Animal Science* 63(3); 1993; 360-362

1576

Chuaqui (O-N), McDougall (TE) and Guerrero (AM). **Validation of o-tyrosine as a marker for detection and dosimetry of irradiated chicken meat.** *Journal of Food Protection* 56(1); 1993; 47-50

o-Tyrosine has been proposed as a marker for postirradiation identification of food that contains protein. Validity of using o-tyrosine for this purpose was tested and established. The validation process involved examination of background levels of o-tyrosine in unirradiated chicken, radiation dose yield, postirradiation storage, dose rate, radiation type, temp. during irradiation, and O_2 concn. during irradiation. o-Tyrosine was present in unirradiated chicken meat at variable levels. However, these background levels were low enough that o-tyrosine can serve to determine whether chicken has been irradiated or not at the commercially approved doses (3 kGy). The radiation dose response curve for formation of o-tyrosine was linear. Apparent yields may vary with the analytical method used; however, it was independent of the dose rate, radiation type, atmosphere, and temp. (above freezing) during irradiation. It was also independent of storage time and temp. after irradiation. It was concluded that this marker can be used to determine the absorbed dose in chicken meat irradiated with either gamma rays or electrons under normal or modified atmospheres. AA

Broilers

1577

Singh (HS) and Sud (SC). **Effect of geriforte on carcass characteristics and meat quality of broilers.** *Indian Journal of Animal Research* 27(1); 1993; 32-34

Effect of geriforte at 3 different dose levels 0.09, 0.26 and 0.45 g/kg feed was studied on a day-old broiler chicks of one hatch, 57 in each group and another control group. Birds were sacrificed at 72 days of age. Live wt. (39%), hot dressed wt. (2%), head, legs, heart, liver, eviscerated wt, (6%) and total ready-to-cook wt. (4%) increased and Giblet wt. (12%) decreased significantly in 0.26 g/kg feed group. Moisture and fat % of the carcass did not differ among various groups. The protein content was significantly higher in treated groups compared to control. The drug at 0.26 g/kg feed increased the feed utilization in broilers. AA

Turkeys

1578

Lee (MB). **The reliability of pop-up timers in turkeys.** *Dairy, Food and Environmental Sanitation* 13(11); 1993; 628-630

Study examines the usefulness of an alternative to the meat probe, namely the "pop-up" timer, in determining turkey doneness. This 2 piece plastic device, composed of a stick like shaft within a golf-tee like frame, 4.5 cm long. When a powder within the frame melts at about 82°C a coiled spring is released and the shaft pops up. The now raised shaft indicates that the turkey is cooked. BV

Products

Eggs

1579

Elkin (RG), Freed (MB), Kieft (KA) and Newton (RS). **Alteration of egg yolk cholesterol content and plasma lipoprotein profiles following administration of a totally synthetic HMG-CoA reductase inhibitor to laying hens.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1094-1101

1580

Yang (TS) and Cunningham (FE). **Stability of egg white lysozyme in combination with other antimicrobial substances.** *Journal of Food Protection* 56(2); 1993; 153-156

The effects of pH, ionic strength and selected antimicrobial substances on the lytic activity of egg white lysozyme over 30 days were studied by observing the rate of clearing of a cell suspension of *Micrococcus lysodeikticus*. During prolonged storage, lysozyme activity remained relatively stable at pH 7 and ionic strength < 0.10, whereas lower activity ($P < 0.05$) was observed at pH 9 and ionic strength > 0.14. Lysozyme activity was highly stable (i.e. maintained over 90% of lytic activity from day 1 to day 30) in 1.0% NaCl, 100 p.p.m. sodium nitrite, 4.0% ethanol and 100 p.p.m. BHT. Lysozyme activity was also stable (i.e. retained over 80% of lytic activity) in 0.1% sodium benzoate and 100 p.p.m. BHA. The lysozyme activity was relatively stable (i.e. retained over 70% of lytic activity) in sol. of 0.3% calcium propionate, 0.1% potassium sorbate and 0.1% propyl paraben. Approx. 50% of the lysozyme activity was retained in 0.5% EDTA. Activity was lost when lysozyme was combined with 0.5% lactic acid, 4% acetic acid and 100 p.p.m. chlorine water. AA

1581

Gast (RK). **Recovery of *Salmonella enteritidis* from inoculated pools of egg contents.** *Journal of Food Protection* 56(1); 1993; 21-24

To determine whether *Salmonella enteritidis* (SE) could be efficiently detected in pools of egg contents, eggs were inoculated with small numbers of SE and the contents of 10 or more eggs were mixed togther. After these pools were incubated, samples were transferred to culture media for isolation and identification of SE. Incubation (at 25 or 37°C) of inoculated egg pools for at least 4 days before culturing resulted in a significant increase in frequency of recovery of SE. Following inoculation of 10-egg pools with approx. 50 cfu, SE was recovered from 11% of pools before incubation and from 94% of incubated pools. Following inoculation of 10-egg pools with approx. 5 cfu, SE was recovered from none of the pools before incubation and from up to 72% of incubated pools. Increasing the size of pools (from 10 to 30 eggs) did not significantly affect frequency of isolation of SE, but reducing the sample vol. transferred from incubated egg pools to culture media (from 20 to 2 ml) led to a significant decrease in SE recovery. At the lower (2 ml) transfer volume, frequency of recovery of SE was not improved by nonselective preenrichment of samples. AA

SEAFOODS

1582

Todd (ECD). **Domoic acid and amnesic shellfish poisoning - a review.** *Journal of Food Protection* 56(1); 1993; 69-83

Amnesic shellfish poisoning, associated with consumption of mussels, is reviewed in the article. Emphasis is placed on the role of domoic acid. Aspects covered are: chronology of the 1987 outbreak in Prince Edward Island (PEI), Canada (description of cases, deaths); development of a specific mouse bioassay for the toxin; isolation and identification of the toxin (domoic acid); testing of shellfish and clinical specimens for domoic acid; detn. of the amount of domoic acid ingested during the PEI outbreak; experimental toxicity in rodents and primates; mechanism of toxicity in the brain; links between animal studies and human intoxication; treatment of cases; definition and name of the clinical syndrome; nature of the mussel industry in PEI; *Nitzschia pungens* f. *multiseries* as a possible source of the toxin; *Nitzschia* blooms in eastern PEI in 1988 and 1989; other sources of domoic acid; uptake and depuration of domoic acid by shellfish; issues associated with extended sampling; the paralytic shellfish poisoning-domoic acid monitoring programme; acceptable levels of domoic acid in shellfish; and future research. 134 references. CSA

Sea urchin

1583

Shimada (K), Nakagawa (S), Hotta (K), Shibata (K) and Yagi (T). **Effect of processing and storage on the fate of vitamins B_1, B_2, and B_6 and nicotinamide of sea urchin gonads.**

Journal of Agricultural and Food Chemistry 41(7); 1993; 1021-1025

Sea urchin gonads (SUG) were dehydrated by standing for several h at 4°C. Half the dehydrated gonads were steamed to inactivate B vitamin degrading enzymes. Steamed and unsteamed SUG were mixed with NaCl (7% w/w) prior to addition of ethanol (10% w/w). Processed SUG were stored in sealed containers at room temp. for up to 180 days. Changes in B vitamin contents were monitored during processing and storage. Thiamin, which accounted for 90% of B1 vitamers in raw SUG, was degraded during processing and storage. FAD was the major B_2 vitamer in raw SUG and was hydrolysed, enzymically, to riboflavin during the first 15 days of storage in unsteamed SUG (no changes were observed in steamed SUG). Vitamin B_2 content decreased from 1.49 to 0.81 μmol/100 g SUG during 180 days of storage. Pyridoxal 5'-phosphate was the predominant B6 vitamer in raw SUG. It was converted to pyridoxamine 5'-phosphate during steaming and pyridoxal and pyridoxamine during other processes. 67.5% of vitamin B_6 was lost during storage. Nicotinamide levels remained fairly constant throughout storage; this was probably due to a balance between chemical losses and release of bound forms. BV

Shrimp

1584

Kantt (CA) and Torres (JA). **Growth inhibition by glucose oxidase of selected organisms associated with the microbial spoilage of shrimp (Pandalus jordani): in vitro model studies.** *Journal of Food Protection* 56(2); 1993; 147-152

The effect of glucose oxidase (GOX)-catalase with different GOX-catalase ratios and of the chemicals produced by GOX, gluconic acid and hydrogen peroxide, were evaluated on 4 spoilage microorganisms associated with shrimp. Growth inhibition was independent of the enzyme ratio within the limits tested. Hydrogen peroxide inhibited *Pseudomonas fluorescens*, *Hansenula polymorpha* and *Acinetobacter calcoaceticum*. Only *Corynebacter aquaticum* was inhibited by gluconic acid but was not affected by hydrogen peroxide. AA

Fish

Crawfish

1585

Dorsa (WJ), Marshall (DL), Moody (MW) and Hackney (CR). **Low temperature growth and thermal inactivation of *Listeria monocytogenes* in precooked crawfish tail meat.** *Journal of Food Protection* 56(2); 1993; 106-109

Growth of *L. monocytogenes* in precooked crawfish tail (CFT) meat at 0, 6 and 12°C was determined. Thermal death times were also determined. Growth curves for *L. monocytogenes* revealed that little multiplication occurred during storage at 0°C for 20 days. At 6 and 12°C, exponential growth began immediately with no observed lag phase. Generation times of 72.2, 17.0 and 6.9 h were calculated at 0, 6 and 12°C, respectively. Observed D values at 55, 60 and 65°C were 10.23, 1.98 and 0.19 min, respectively. The z value for *L. monocytogenes* in precooked CFT meat was calculated to be 5.5°C. Results indicate that a refrigeration temp. of 6°C (42.8°F) will support *L. monocytogenes* growth and short-term temp. abuse at 12°C will induce very rapid growth of the organism on CFT meat. Observed thermal treatment values can be used to establish postpicking heat treatments to eliminate *L. monocytogenes* from packaged CFT meat prior to retail sale. AA

PROTEIN FOODS

1586

Dornblaser (L). **Healthy claims make healthy gains.** *Prepared Foods* 162(5); 1993; 8-9

Dietetic foods, i.e. low-calorie, low-fat, all-natural, reduced-sodium, high fibre, reduced-sugar, added calcium and organic, introduced onto the US market in 1992 are discussed. Aspects considered include: effect of the National Labeling and Education Act on health claims; low fat product introductions;

low cholesterol foods (companies did not promote the low cholesterol benefits of foods as much as in previous years); 'lite' products; natural, additive-free products; organic foods (increased 38% to 510 new products from 370 in 1991); sodium-reduced foods (reduced sodium claims made in conjunction with cholesterol-, calorie- and fat-reduction claims); foods containing sugar substitutes; calcium enriched foods; and foods containing added fibre (few foods were introduced in this category). BV

Infant foods

1587

Dornblaser (L). **Baby foods toddle along.** *Prepared Foods* 162(5); 1993; 47

New food products introduced for infants in the US in 1992 are discussed. 53 new infant food introduced were reported. Aspects discussed include: products specifically for toddlers; microwaveable main dishes; organic dinners in jars; combined fruit and vegetable juices; shelf-stable concentrates; yoghurt breakfasts; low acid juices; and soy-based formulas. BV

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1588

Hertog (MGL), Hollman (PCH) and Putte (BVande). **Content of potentially anticarcinogenic flavonoids of tea infusions, wines, and fruit juices.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1242-1246

Contents of the potentially anticarcinogenic flavonoids quercetin, kaempferol, myricetin, apigenin and luteolin in commonly consumed beverages were determined by reversed-phase HPLC with UV detection. Flavonoid levels in beer, coffee, chocolate milk and white wine were < 1 mg/l. 12 types of tea infusion, 6 types of wine, apple juice, tomato juice, grape juice, orange juice, grapefruit juice and lemon juice were analysed. Luteolin and apigenin were not detected in any of the beverages. In red wines and grape juice, quercetin and myricetin levels varying from 4 to 16 mg/l and from 7 to 9 mg/l, respectively, were detected. Quercetin levels in fruit juices were generally less than 5 mg/l except for lemon juice (7 mg/l) and tomato juice (13 mg/l). In black tea infusions quercetin (10-25 mg/l), kaempferol (7-17 mg/l) and myricetin (2-5 mg/l) were detected. Flavonoid levels in green tea were comparable to those in black tea. The flavonoid content of tea prepared with tea bags was generally higher than that of tea prepared with loose leaves. Together with data on flavonoid contents of vegetables and fruits published previously [J. Agric. Fd Chem. 40, 1992, 2379], results provide a base for an epidemiological evaluation of the potentially anticarcinogenic effects of flavonoids. AA

1589

Davis (S). **The new beverage choice is crystal clear.** *Prepared Foods* 162(5); 1993; 57, 59, 61

Development of new products in the beverages category in the US in 1992 is described. Number of new beverages increased was 12.5% over that from 1991. Trends included increased numbers of clear beverages, bottled waters, ready-to-drink iced teas, and sparkling flavoured drinks. BV

Alcoholic beverages

Wines

1590

Borja (R), Martin (A), Luque (M) and Duran (MM). **Kinetic study of anaerobic digestion of wine distillery wastewater.** *Process Biochemistry* 28(2); 1993; 83-90

Non-alcoholic beverages

Fruit juices

1591

Rai (T), Bajaj (VK) and Singh (S). **Application of membrane processing for concentration of fruit juices.** *Beverage and Food World* 21(4); 1994; 13-14, 31

The application of membrane processing (MP) may produce fruit juice conc. of desirable quality at low cost. In a single step MP perform juice clarification and fining, which are otherwise accomplished in traditional process in multiple steps involving the use of fining agents enzymes and centrifugation. During concn. of fruit juices by evaporation, much of essence, various volatile alcohols, esters and aldehydes are lost while there has been no loss in the quality and overall aroma and flavour of membrane concentrated fruit juice. MP of fruit juice require significantly less energy/pound of the removal of water. SRA

1592

Anon. **Tropical fruits pack a punch.** *Prepared Foods* 162(6); 1993; 64-65

Use of tropical fruits in processed foods and beverages is discussed. In 1992, a 20.2% increase over 1991 in the number of foods and beverages introduced that included mango, passion fruit, guava or banana on their label was observed. Aspects discussed include: reliable, consistent sources of tropical fruits; quality control of fruits; documentation of the use of agricultural compounds on the fruit; fruit inspection; separation of juice; nutritional properties of tropical fruits; flavour properties; use in beverages and processed foods; demand for tropical fruit-containing foods in Europe; and growth potential in the US. BV

Kinnow mandarin juices

1593

Khurdiya (DS) and Lotha (RE). **Effect of blending of Kinnow mandarin juices on the quality of the blend juice and nectar.** *Indian Food Packer* 48(3); 1994; 41-45

Blended juice and nectars of Kinnow mandarin fruits were prepared using juice extracted by hydraulic pressing (HP) and crushing with peel (CP) method. Juice of CP was blended with the juice of HP ranging from 10 to 50%. Nectar containing 40% juice, 15°Brix and 0.3% acidity was prepared and heat processed. Juice yield was 46 and 48.4% from HP and CP methods respectively. When the HP juice having a lower TSS (10.4%) and the CP juice with a higher TSS (12.3%) were blended, TSS increased with proportion of CP juice. GS

Mango juices

1594

Seshadri (KS), Gowramma (RV), Mahadeviah (M), Kumar (KR) and Mahendrapandian (S). **Packaging of mango juice in flexible packaging material.** *Indian Food Packer* 48(3); 1994; 25-29

Mango juice packed in stand up pouch (metallised polyester/HD-LD coextruded) to find its suitability compared to tin plate container were stored under 3 conditions (1) refrigerated condition 4°C (2) 27°C/65% RH (ambient condition); and (3) 38°C/90% RH. Sensory evaluation of juice indicated that stand up pouch gave a shelf life of 60 days under refrigerated condition, 45 days under ambient condition and 30 days under 38°C/90% RH. AA

Raspberries juices

1595

Rommel (A) and Wrolstad (RE). **Influence of acid and base hydrolysis on the phenolic composition of red raspberry juice.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1237-1241

Acid [2N HCl, 30 min, boiling] and base [2N NaOH, 2 h, room temp.] hydrolysis simplified the complex HPLC profile of red raspberry juice phenolics. In 3 acid-hydrolysed juices, ellagic acid, 2 unidentified ellagic acid compounds, and gallic, p-hydroxybenzoic, protocatechuic, caffeic, p-coumaric and ferulic acids, as well as (+)-catechin, (-)-epicatechin, quercetin and kaempferol were separated and identified using HPLC diode array spectral techniques. The % of HPLC peak area for these phenolics were similar in acid-hydrolysed juices. In base-hydrolysed samples the same phenolics, except the 2nd ellagic acid compound, were present and the 1st ellagic acid compound was present in smaller quantity. Sep-Pak C18 cartridges were used for sample preparation. Hydrolysis could be a useful tool for screening of raspberry juices for qualitative deviations from authentic HPLC profiles to determine adulteration by other fruit juices or phenolic mixes. AA

Tea

1596

Muroi (H) and Kubo (I). **Combination effects of antibacterial compounds in green tea flavour against *Streptococcus mutans*.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1102-1105

Combinations of green tea flavour compounds with indole were tested for antibacterial activity against *Streptococcus mutans*, a bacterium responsible for causing dental caries. Synergism was found in the combination of sesquiterpene hydrocarbons (δ-cadinene and β-caryophyllene) with indole; their bactericidal activities increased from 128-fold to 256-fold. The combination effect was confirmed by time-kill curve assay which showed that 6.25 μg/ml δ-cadinene combined with 400 μg/ml (subinhibitory concn.) indole was bactericidal against *S. mutans*. The combination of 25 μg/ml δ-cadinene and 400 μg/ml indole reduced the number of viable cells at any stage of growth. AA

FATS AND OILS

1597

Wei-Tsai (S), and Sheng-Chang (C). **Kinetics of lipase-catalyzed hydrolysis of lipids in biphasic organic-aqueous systems.** *Journal of Chemical Technology and Biotechnology* 57(2); 1993; 147-154

A kinetic model is presented for lipase hydrolytic reactions in biphasic systems, with or without the addition of water-immiscible organic solvents. The effects of certain parameters, e.g. enzyme concn., mixing speed, vol. fraction of the aqueous phase and substrate concn., on the reaction rate are demonstrated. BV

1598

Kennedy (MJ), Reader (SL) and Davies (RJ). **Fatty acid production characteristics of fungi with particular emphasis on** γ-linolenic acid production. *Biotechnology and Bioengineering* 42(5); 1993; 625-634

Fatty acid production characteristics of fungi were investigated. A characteristic relationship between the oil content of the cell and the fatty acid content of the oil was observed. For example, for polyunsaturated fatty acid production by *Mucor hiemalis* IPD 51, the oil content of the cell and the γ-linolenic acid (GLA) content of the oil were coupled. A model of max. fatty acid production was developed to link fatty acid content of oil and the oil content of cells. Max. volumetric productivity of GLA occurred at a specific GLA content of the oil. For example, for *M. hiemalis* IPD 51, a max. volumetric productivity of 4.7 mg GLA/l/h was produced at a GLA content of the oil of 8-10%. Similarly for Mucor circinelloides var. Tieghem IPD 155 a max. volumetric productivity of 4.8 mg GLA/l/h was produced at a GLA content of the oil of 14-16%. Results indicate that, when screening microorganisms for GLA or other fatty acid production, a number of medium compositions need to be evaluated to determine the relationship between oil content of the cell and fatty acid content of the oil. AA

Oils

1599

Halvorsen (JD), Mammel (WCJr) and Clements (LD). **Density estimation for fatty acids and vegetable oils based on their fatty acid composition.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 875-880

The liquid density (LC) of fatty acids can be accurately estimated by the modified Rackett equation (MRE) over a wide range of temp. The MER requires the critical properties and an empirical parameter, Z_{RA}, for each acid as the basis for computing density as a function of temp. The LD of vegetable oils can be estimated by using mixture properties corresponding to the fatty acid composition and a correction for triglyceride form. The density prediction is explicitly temp. dependent. AA

1600

Kurashige (J), Matsuzaki (N) and Takahashi (H). **Enzymatic modification of canola/palm oil mixtures: effects on the fluidity of the mixture.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 849-852

The bioreactor system to interesterify edible oils and fats at an ultra-micro aqueous phase of 100 p.p.m. and less was investigated. The adsorption of lecithin, together with lipase onto a carrier, was effective for conducting the interesterifying reaction efficiently for oils and fats in micro aqueous phase. To improve the handling properties of palm oil at rather low temp., palm oil was blended with canola (rapeseed) or soybean oil, and then these blended oils were modified by enzymic selective interesterification in a solvent-free, ultra-micro aqueous bioreactor system with an immobilized lipase that had 1,3-positional specificity. Effects of enzymic interesterification were confirmed by triglyceride detn., by solid fat content profiles and by cloud point profiles, which were also compared to products of chemical interesterification. The improvement in the fluidity of blended oils with canola oil by the enzymic reaction was greater than with soybean oil; and chemical interesterification had no effects on the fluidity of blended oils. BV

1601

Poncelet (D), Leung (R), Centomo (L) and Neufeld (RJ). **Microencapsulation of silicone oils within polyamide-polyethylenimine membranes as oxygen carriers for bioreactor oxygenation.** *Journal of Chemical Technology and Biotechnology* 57(3); 1993; 253-263

1602

Best (D). **The dope on frying oil quality.** *Prepared Foods* 162(3); 1993; 63-64

Techniques for extending the life of frying oils are described. Aspects covered include: costs savings; product quality; degradation of frying oils; controlling degradation reactions; health implications of frying oils (acrolein, a volatile degradation product of the glycerol portion of fats); proper maintenance of frying oils; use of passive filters (e.g. diatomaceous earth); use of active filters; and use of antioxidants. BV

Groundnut oils

1603

Chiou (RYY), Cheng (SL), Tseng (CY) and Lin (TC). **Flavor fortification and characterization of raw peanut oils subjected to roasting with partially defatted peanut meal under various atmospheric conditions.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1110-1113

Raw peanut oil was combined with partially defatted peanut meal at a ratio of 10:1 (w/w) and roasted at 160°C for 30 min in a closed chamber under [air, vacuum, CO_2, N_2 or He, or in an open container]. Addition of 10-20% moisture to peanut meal was essential for the formation of peanutty flavour in oil. A unique and pleasant roasted peanut flavour was achieved when roasting was carried out under atmospheres of CO_2 and He. The free fatty acid content increased in the oil when the atmosphere during roasting consisted of O_2, while slight decreases were observed in oils prepared using other atmospheric gas systems. After storage at 62°C for 35 days, free fatty acid and conjugated diene hydroperoxide contents increased in oils subjected to all treatments. However, the fatty acid composition in oils varied only within a limited range. Significant antioxidative activities were observed in peanut oils roasted with partially defatted peanut meal under CO_2, He and N_2. AA

Linseed oils

1604

Bhatty (RS). **Further compositional analyses of flax: mucilage, trypsin inhibitors and hydrocyanic acid.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 899-904

Registered Canadian cv. of flax [linseed; *Linum usitatissimum* L.] and laboratory-prepared and commercially obtained samples of linseed meal (LM), were used to determine extract viscosity and mucilage, trypsin inhibitors and hydrocyanic acid (HCN) concn. The mucilage readily leached out from the seed coat (hull) fragments soaked in water, leaving behind pentagon-shaped cells. Extract viscosity significantly varied in the laboratory-prepared (23-48 cS) and commercially obtained (30-68 cS) samples of LM and may be used to obtain an indirect, qualitative estimate of flax mucilage. Mucilage was extracted from whole seed in 5.0-5.3% yields and contained 20-24% protein, approx. 10% ash and 30% total carbohydrates. Laboratory-prepared LM (raw) contained 42-51 units of trypsin inhibitor activity, commercially obtained samples, 14-37 units, and raw rapeseed and soybean meals, 99 and 1650 units, respectively. Picric acid tests (qualitative) showed only traces of HCN in 10 cv. of freshly ground flax. The acid silver nitrate titration procedure measured HCN quantitatively, but showed its presence only in 3 of the 5 cv. investigated. HCN was conveniently measured by a colorimetric procedure (barbituric acid-pyridine reaction), which may be used to screen flax cv. HCN content of flax was significantly influenced by environments (growth location and season) and, to a less extent, by cv. AA

Olive oils

1605

Frega (N), Bocci (F) and Lercker (G). **High-resolution gas chromatographic determination of alkanols in oils extracted from olives.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 919-921

1606

Pradas (GE), Sanchez (VM) and Campo (GA). **Influence of the physical-chemistry properties of an acid activated bentonite in the bleaching of olive oil.** *Journal of Chemical Technology and Biotechnology* 57(3); 1993; 213-216

Natural bentonite and H_2SO_4 (0.5-5.0M) treated bentonite were used at 90°C in the bleaching of olive oil from Jaen, Spain. Bleaching capacities were calculated using the Freundlich equation. Bleaching capacities, measured as KF, a constant related to bleaching efficiency, ranged from 2.5×10^{-7} for non-treated bentonite up to 0.81 for 5.0M H_2SO_4-treated bentonite and 0.85 for 2.5M H_2SO_4-treated bentonite. BV

1607

Sayadi (S) and Ellouz (R). **Screening of white rot fungi for the treatment of olive mill waste-waters.** *Journal of Chemical Technology and Biotechnology* 57(2); 1993; 141-146

Rapeseed oils

1608

Mailer (RJ), Daun (J) and Scarth (R). **Cultivar identification in *Brassica napus* L. by reversed-phase high-performance liquid chromatography of ethanol extracts.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 863-866

A method was developed to identify cv. of rapeseed (*Brassica napus* L.), an outcrossing sp., by reversed-phase HPLC based on the separation of ethanol-extractable seed components. Defatted flour was extracted into 70% ethanol in water, and chromatography was carried out in a reversed-phase C18 column. Optimum results were achieved using water as mobile phase with a gradient to 50% acetonitrile and peak detection at 210 nm and 240 nm. Trifluoroacetic acid (0.1%) was added to dissociate proteins. Extraction and chromatographic conditions were reproducible, and significant differences were found in the chromatograms of the 29 cv. studied. Chromatographic differences between these cv. were stable over a range of growing environments. It was possible to allocate unknown cv. to their correct classes using the HPLC method together with discriminate analysis. This test has potential as a method of characterization for cv. registration. BV

1609

Tautorus (CL) and Low (NH). **Chemical aspects of chlorphyll breakdown products and their relevance to canola oil stability.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 843-847

Production of prooxidant compounds by subjecting chlorophyll a or pheophytin a to laboratory-scale processing in the presence of canola [rapeseed] oil (CO) or tricapryloylglycerol (TCG) was investigated. Addition of chlorophyll a (60 p.p.m.) to CO prior to processing resulted in an oil of lowered stability. No single processing step contributed solely to the instability resulting when pheophytin a was added (60 p.p.m.) to CO prior to processing. To isolate the effect of processing on the pigment, TCG was used in place of unsaturated CO as a carrier for pheophytin a (60 p.p.m.). A control consisted of processed TCG that had no pheophytin added prior to processing. The subsequent addition of pigment-treated processed TCG to linseed oil (1:1, w/w) caused a decrease in the stability of the latter, when compared with the control. No differences were observed between the prooxidant TCG and the control TCG by methods involving UV spectroscopy and TLC or GC. BV

1610

Suzuki (K) and Nishioka (A). **Behavior of chlorophyll derivatives in canola oil processing.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 837-841

Chlorophyll derivatives in canola [rapeseed] oil (CO) were analysed quantitatively by reversed-phase HPLC without any pretreatment. The main components were pheophytin (pheo) a and b and pyropheophytin (pyro) a and b. Factors affecting types and concn. of chlorophyll derivatives in oil were investigated during seed preparation, expelling, extraction, degumming and alkali-refining processes. Bleaching tests of alkali-refined CO with activated earth indicated that the adsorption of each derivative decreased in the following order: pheo a > pyro a > pheo b > pyro b. In bleaching with activated C, the following order was observed: pyro b > pheo b > pheo a > pyro a. AA

1611

Henderson (JH). **A laboratory study of the press effect in adsorptive bleaching.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 831-835

The so-called press effect is widely credited with enhancing the overall efficiency of bleaching clays (BC) in commercial operations. Laboratory bleaches are generally carried out with one use of BC, while plant operations often include a process in which spent clay in a filter press acts as a fixed bed to remove additional impurities from slurry-treated oil. The press effect was simulated in the laboratory by measuring the influence of a progressively-built filter cake on concn. of carotenes and chlorophyll in successive batches of slurry-contacted oils. The oil used was canola (rapeseed); the clay tested was a commercially available acid-activated clay classified to 2 different average particle sizes. Conditions were chosen to simulate those used in commercial operations. Better total bleaching was observed from the 1st batch to the last as filter cake was built up. A significant particle size effect was observed. AA

1612

Sosulski (K) and Sosulski (FW). **Enzyme-aided vs. two-stage processing of canola: technology, product quality and cost evaluation.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 825-829

Use of carbohydrases (SP-249 and Olease 0.1 and 0.01% respectively) to enhance oil extraction during pressing [of rapeseed] in a lab. expeller was investigated. Enzyme-treated seeds at 6% moisture were pressed in the expeller set at full-press conditions. Control seeds were pressed at wider choke openings but at the same barrel pressures as enzyme-treated samples. Time of pressing and temp. and pressure inside the expeller barrel were used to calculate throughput and energy requirements/unit wt. of processed material. Treatment with enzymes improved throughput of the expeller, increased oil flow rate and oil recovery. Material throughput was increased by 30-50%, depending on canola var. Recovery of the oil was increased from 72% of the seed oil for control samples, to 90-93% for enzyme-treated samples. The average residual oil content in presscakes from enzyme-treated seeds was 7.4%. Oil quality was inferior to cold-pressed control but was much better than has been reported for solvent-extracted oil. BV

Rice bran oils

1613

Gopala Krishna (AG). **Influence of viscosity on wax settling and refining loss in rice bran oil.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 895-898

The role of viscosity on wax settling and refining loss (RL) in rice bran oil (RBO) was studied using model systems of refined peanut oil and RBO of different free fatty acids contents. Wax was the only constituent of RBO that significantly increased the viscosity (81.5%) of oil. Monoglycerides (MG) synergistically raised the viscosity of the oil (by 114.2%) and lowered the rate of wax settling. Although a reduction in the viscosity of the oil significantly decreased the refining loss, the min. loss attained was still 20% more than the theoretically predicted value. This study indicates that some chemical constituents, such as MG must be removed before dewaxing; and that removal of oryzanol and phospholipids would reduce RL. BV

1614

Munshi (SK), Bhatia (N), Sekhon (BS) and Sukhija (PS). **Inactivation of rice bran lipase with metal ions.** *Journal of Chemical Technology and Biotechnology* 57(2); 1993; 169-174

Rice bran lipase was purified and characterized and the effects of metal ions as inhibitors of lipase activity were investigated. Lipase was extracted from rice bran and purified 333-fold by ammonium sulphate fractionation and chromatography. Lipase activity was completely inhibited by Fe^{3+} and Ni^{2+} at 5×10^{-5}M and by Zn^{2+} and Cu^{2+} at 2.5×10^{-4}M. Results from in vivo inactivation of rice bran lipase showed that Fe^{3+} and Ni^{2+} at 200 µg/g significantly inhibited the release of free fatty acids from rice bran during 6 days storage when compared to a control (2% v/w HCl) treatment. It is suggested that Fe^{3+} and Ni^{2+} could be used commercially to inhibit lipase hydrolysis of rice bran triglycerides and thus contribute to the improved quality of edible rice bran oils. BV

Soybean oils

1615

O'Keefe (SF), Wiley (VA) and Wright (D). **Effect of temperature on linolenic acid loss and 18:3 δ9-cis, δ12-cis, δ15-trans formation in soybean oil.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 915-917

Oil was extracted from soybeans, degummed; alkali-refined and bleached. The oil was heated at 160, 180, 200, 220 and 240°C for up to 156 h. Fatty acid methyl esters were prepared by boron triglyceride - catalysed trans esterification. GLC with a cyanopropyl CPSil88 column was used to separate and quantitate fatty acid methyl esters. Fatty acids were identified by comparison of retention times with standards and were calculated as area % and mg/g oil based on 17:0 internal standard. The rates of 18:3ω3 loss and 18:3 δ9-cis, δ12-cis, δ15-trans (18:3,*c*,*c*,*t*) formation were determined, and the activation energies were calculated from Arrhenius plots. Freshly prepared soybean oil had 10.1% 18:3ω3 and no detectable 18:3*c*,*c*,*t*. Loss of 18:3ω3 followed apparent 1st-order kinetics. The first-order rate constants ranged from 0.0018 plus/minus 0.00014 min^{-1} at 160°C to 0.083 plus/minus 0.0033 min^{-1} at 240°C. Formation of 18:3*c*,*c*,*t* did not follow simple kinetics, and initial rates were estimated. The initial rates (mg/g oil/h) of 18:3*c*,*c*,*t* formation ranged from 0.0031 plus/minus 0.0006 at 160°C to 2.4 plus/minus 0.24 at 240°C. The Arrhenius activation energy for 18:3ω3 loss was 82.1 plus/minus 7.2 kJ mol^{-1}. The apparent Arrhenius activation energy for 18:3*c*,*c*,*t* formation was 146.0 plus/minus 13.0 kJ mol^{-1}. Results indicate that small differences in heating temp. can have a profound effect on 18:3*c*,*c*,*t* formation. Selection of appropriate deodorization conditions could limit the amount of 18:3*c*,*c*,*t* produced. AA

1616

Smith (DD), Agrawal (YC), Sarkar (BC) and Singh (BPN). **Enzymatic hydrolysis pretreatment for mechanical expelling of soybeans.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 885-890

Mechanical expelling of soybeans with enzymic hydrolysis as pretreatment was investigated and the process parameters were optimized by means of response surface methodology. Enzyme pretreatment enhanced both the amount of extractable oil in soybeans and oil extractability. A second-order response surface model was developed to predict the expelled oil as a function of the 6 process parameters investigated. The optimum was found at: moisture content during hydrolysis, 23.00% wet basis (w.b.); enzyme concn., 11.84% v/w; incubation period, 13.24 h; moisture content during pressing, 9.36% w.b.; pressing pressure, 75 MPa; and pressing time, 5.36 min. The parameters had no interactive effects on expelled oil. Pressing pressures greater than 75 MPa caused extrusion. Under the optimal conditions, oil expelled from dehulled cracked soybeans by static pressing at room temp.

(18°C) was 63.5% of the total extractable oil. Much higher oil recovery would be expected in actual screw expellers due to dynamic pressing and higher operating temp. Oil recovery could be further increased by adding greater than or equal to 1 conventional pretreatments to the enzymic hydrolysis pretreatment investigated in this study. AA

SPICES AND CONDIMENTS

Condiments

1617

Davis (S). **New condiments offer the spice of life.** *Prepared Foods* 162(5); 1993; 73-74

Development of new condiment products in the US in 1992 is discussed. The number of new products introduced decreased by 8% in 1992. Aspects discussed include; sauces, many garlic-enhanced; Mexican seasonings and mixes; salsa/ketchup combinations; cooking sauces (barbecue, spaghetti, Italian, Caribbean); salad dressings, mustard and oils; and jellies and preserves. BV

Spices

Chillies

1618

Bernal (MA), Calderon (AA), Pedreno (MA), Munoz (R), Ros (B-A), Merino (deC-F). **Capsaicin oxidation by peroxidase from *Capsicum annuum* (var. *annuum*) fruits.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1041-1044

Capsaicin (8-methyl-N-vanillyl-6-nonenamide) oxidation by peroxidase (EC 1.11.1.7) from *Capsicum annuum* var. *annuum* fruits was studied. Capsaicin contained 2 components which were oxidized indistinctively by capsicum peroxidase (CP), when capsaicin disappearance was monitored by HPLC. Capsaicin oxidation by CP caused max. spectral changes at 262 nm. The apparent extinction coeff. for the only oxidation product absorbing at 262 nm was calculated as 5.3 x 10^2 M^{-1} cm^{-1}. Dependence of capsaicin oxidation rate by CP on capsaicin and H_2O_2 concn. revealed Michaelis-Menten-type kinetics with inhibition at high substrate concn. and an acidic pH optimum. Results indicate that capsaicin is oxidized by CP and that a possible participation of peroxidase in capsaicin metabolism in capsicums should be considered. BV

SENSORY EVALUATION

1619

Bourne (MC). **Converting from empirical to rheological tests on foods - its a matter of time.** *Cereal Foods World* 39(1); 1994; 37-39

The author discusses a dilemma in rheological studies of foods - fundamental tests are poor predictors of sensory quality whereas empirical tests are good predictors but not rigorously defined. CSA

1620

Xiaogen (Y), Lederer (C), McDaniel (M) and Deinzer (M). **Chemical analysis and sensory evaluation of hydrolysis products of humulene epoxides II and III.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1300-1304

A method was developed to identify hydrolysis and isomerization products of humulene epoxides II and III in beer. The method involved a continuous liquid-liquid extraction, cleanup and concn. procedure and analysis by GC/MS. 12 compounds were identified in the concn. range 0.002-2.8 mg/l in pilot brew and commercial beer samples. 7 of these compounds have not been found in beer before. A var. of hop essential oils, obtained by steam distillation, also was analysed by GC/MS. In addition to humulene monoepoxides I-III, humulenol II and 2,6,6,9-tetramethyl-2,4,8-cycloundecatrieno-1-ol (TMCD) were found in hop oils. TMDC has not been reported as a hop oil component previously. Sensory profiles of individual compounds and their mixtures produced by hydrolysis of humulene epoxides II and III were evaluated by a descriptive sensory panel. Overall, these compounds could be described as contributing cedar, lime and spicy aromas to the beer. The estimated threshold value for the hydrolysis mixture of humulene epoxide II in beer was 2.3 p.p.m. AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

1621

Sam (P-L), Yunje (C) and Batt (CA). **Enhancing the gelation of β-lactoglobulin.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1343-1348

1622

Danno (G), Kanazawa (K), Toda (M), Mizuno (M), Ashida (H), Natake (M). **A mutagen from histidine reacted with nitrite.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1090-1093

Mutagenicity of the reaction products of L-histidine with sodium nitrite at pH 4.0 were studied. 1 of the 5 reaction products obtained showed mutagenicity in *Salmonella typhimurium* his reversion assay. The mutagen was purified by crystallization and identified as (1-nitroso-1*H*-imidazol-4-yl)acetohydroxamic acid (NIAH), which results from histidine undergoing nitrosation at the imidazolic secondary amine and oxidation of the primary amine at the side chain. NIAH showed a lethal mutation on TA98 strain without S9 mix and then was submitted to the induced mutation frequency (IMF) test. NIAH gave a dose-dependent IMF value on TA98; the value at 10 mug/plate was 4.29×10^{-6}/cell. NIAH exhibited weak mutagenicity on TA100 strain and did not have a DNA-damaging activity on H17 Rec^+ and M45 Rec^- of *Bacillus subtilis*. Therefore, NIAH was considered to be a frame-shift-type mutagen. AA

1623

Oh (S), Catignani (GL) and Swaisgood (HE). **Characteristics of an immobilized form of transglutaminase: a possible increase in substrate specificity by selective interaction with a protein spacer.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1337-1342

Transglutaminase was covalently immobilized on poly(lysyl)-alphas-casein which was covalently attached to 3-aminopropyl porous glass. Attachment of polylysine to the protein spacer, using soluble transglutaminase as a catalyst, greatly increased the concn. of immobilization sites, resulting in a 74% yield of immobilized protein. Catalytic efficiencies, k_{cat}/K_m, for the immobilized form were 12-13% of that for the soluble enzyme with either α_s-casein or β-lactoglobulin as substrate. The catalytic efficiency was 5-fold greater with α_s-casein than with β-lactoglobulin using either soluble or immobilized enzyme. Selective interaction of the protein substrate with the protein spacer resulted in selective catalysis of isopeptide bond formation in α_s-casein due to increased local concn. of this protein in the immobilized enzyme matrix. When a mixture of α_s-casein and β-lactoglobulin was used as substrate, preferential cross-linking of α_s-casein occurred with the immobilized enzyme as compared with the soluble enzyme. AA

1624

Potter (SM), Jimenez (F-R), Pollack (J), Lone (TA) and Berber (J-MD). **Protein-saponin interaction and its influence on blood lipids.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1287-1291

Protein source and saponins have been shown to influence lipid metabolism; however, little is known about the chemical interactions between proteins and saponins or the impact of addition of dietary saponins to different proteins on cholesterolaemia. Quillaja saponin was added to casein and to soy protein isolates (SPI) and the saponin-protein interaction was investigated by gel electrophoresis and fluoroscopy. The impact on cholesterol metabolism also was investigated in gerbils. Results from interaction studies showed that high mol. wt. complexes were formed gradually between saponins and caseins, with beta-casein being most susceptible. The resulting complexes differed drastically in charge and mol. wt. In contrast, SPI formed insoluble aggregates during heating independently of the presence of added quillaja saponin. Data from the animal study showed that addition of saponin to SPI did not affect serum lipids, while addition of saponin to casein resulted in significant decreases of LDL cholesterol and LDL/HDL ratios, resulting in values similar to those of SPI-fed animals. Results indicate that the effect of saponins on serum lipid profiles is dependent on the source of dietary protein. This could be explained by the finding that quillaja saponin reacted differently with caseins as compared to soy protein isolate. AA

1625

Osada (K), Kodama (T), Yamada (K) and Sugano (M). **Oxidation of cholesterol by heating.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1198-1202

Oxidation of pure cholesterol during heating in an air oven at high temp. [100°C] was studied. Cholesterol was virtually stable during heating at 100°C for 24 h but was unstable at > 120°C. In the heated cholesterol preparations, a number of oxidized derivatives were detected by a combination of TLC and capillary GC-MS. Major oxidized sterols were 7α-hydroxycholesterol, 7β-hydroxycholesterol, 5α-epoxycholesterol, 5β-epoxycholesterol, cholestanetriol and 7-ketocholesterol. Various oxidized cholesterol derivatives were produced during heating above 120°C within a relatively short time (1 h). The composition of oxidized products differed depending on temp. and time of heating. When cholesterol was heated at 150°C, production of oxidized cholesterol was max., 7-ketocholesterol being the predominant oxidized product. Heating at 120°C also produced oxidized cholesterol to some extent, whereas only marginal amounts of oxidized cholesterols were produced at 100°C; at 200°C cholesterol was decomposed within 6 h. AA

1626

Matsudomi (N), Oshita (T), Kobayashi (K) and Kinsella (JE). **α-Lactalbumin enhances the gelation properties of bovine serum albumin.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1053-1057

Effects of α-lactalbumin (α-La) addition to bovine serum albumin (BSA) on its gelling properties were investigated. A BSA concn. of 4% (w/v) was required for formation of a self-supporting gel following heating at 80°C for 30 min in 100mM sodium phosphate buffer (pH 6.8). Sol. of α-La, at concn. of s8% (w/v), did not gel under the same conditions. Addition of 3% α-La to 6% BSA caused a significant increase in gel hardness; gels thus obtained were transparent. BSA and α-La interacted to form soluble aggregates through thiol-disulphide interchange reaction during gel formation. The soluble aggregates formed during heating of the mixture of BSA and α-La had lower mol. wt. than those formed from BSA alone. The enhancing effect of α-La on gel hardness of BSA was ascribed to the formation of a finer, more uniform gel matrix. AA

1627

Ching (YM), Paquet (A) and McKellar (RC). **Effect of fatty N-acylamino acids on some functional properties of two food proteins.** *Journal of Agricultural and Food Chemistry* 41(8); 1993; 1182-1186

Effects of fatty N-acylamino acids on foaming, emulsifying and gelling properties of (spray-dried) egg white and whey protein isolates were investigated. Overrun, emulsifying activity and gelling properties of the 2 protein products were generally enhanced by addition of 0.1-0.5% of the fatty N-acylamino acids, while foaming stability was lowered. Both lauroyl (C12) and myristoyl (C14) derivatives were highly effective, particularly derivatives of phenylalanine and methionine. The palmitoyl (C16) and stearoyl (C16) derivatives were less effective, while esters of active derivatives did not affect protein functionality. Thermal characteristics of the proteins were modified by fatty N-acylamino acids and were related to changes in functional properties. Results suggest that fatty N-acylamino acids may be of use as multifunctional food additives. AA

1628

Ferjancic (B-A), Gaertner (H) and Puigserver (A). **Papain-catalyzed hydrolysis of and amino acid incorporation into BSA and zein substrates in low water organic media.** *Journal of Agricultural and Food Chemistry* 41(7); 1993; 1152-1157

Papain, either modified with polyethylene glycol (PEG) or as a suspended powder, was used to catalyse digestion of protein substrates in organic solvents to gain insights into protein-protein interactions in media of this kind. Bovine serum albumin was efficiently hydrolysed in toluene containing 1-2% added water (v/v). The extent of proteolysis, as estimated by amino group determination, depended on the water concn. and, under optimal conditions, was 20% higher than that obtained in aqueous media using the same enzyme/substrate ratio. The highest rate of hydrolysis was obtained in the most hydrophobic solvent, but attachment of PEG chains to the enzyme did not enhance the catalysis. Proteolysis in organic solvents can be said to constitute an interesting approach to the enzymic digestion of proteins and amino acid incorporation involved in aminolysis. In the case of the hydrophobic protein zein, greater than 10% of the peptide bonds were hydrolysed by PEG-papain in toluene, and in the presence of a potent nucleophile such as Lys-OMe or Lys-NH_2 the transpeptidation reaction resulted in an increase in the lysine content of zein from 0.15% to 3.5% and 10.4%, respectively. Use of organic media, therefore, provides a potentially useful approach to the enzymic modification of food protein. AA

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

1629

Sohrab. **ISO 9000: A pre-requisite for product certification.** *Indian Food Industry* 12(3); 1993; 38-40

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FOOD PROCESSING

1630

Puri (VM) and Anantheswaran (RC). **The finite-element method in food processing: a review.** *Journal of Food Engineering* 19(3); 1993; 247-274

The finite-element method (FEM) has been used to model several food processing operations. Applications of FEM to solve problems in food processing are discussed; use of FEM in other areas of food processing are also outlined. Specific aspects covered include: heating (for drying) and cooling (for aeration); freezing and thawing; heat and mass transfer; and mechanical damage. Other potential uses of FEM discussed include: baking; extrusion; aseptic processing; microwave heating; and optimization of food quality in terms of texture, nutrient retention and microbial degradation during thermal processing. BV

1631

Bengtsson (E), Traegardh (G) and Hallstroem (B). **Concentration polarization during the enrichment of aroma compounds from a water solution by pervaporation.** *Journal of Food Engineering* 19(4); 1993; 399-407

Pervaporation is a useful technique for recovery and enrichment of aroma compounds from very dilute solutions. To study mass transfer, a 0.5 p.p.m. solution of butyl butyrate, an important aroma compound present in, for example, apple juice, was pervaporated at different circulation velocities along a PDMS (polydimethylsiloxane) membrane. Permeation of butyl butyrate increased with increasing Reynolds number, demonstrating an influence of concentration polarization. To minimize the effect of the polarized layer and to improve mass transfer, optimization of the feed-circulation velocity is important. AA

FOOD PACKAGING

Nil

FOOD ENGINEERING AND EQUIPMENT

1632

Califano (AN) and Zaritzky (NE). **A numerical method for simulating heat transfer in heterogeneous and irregularly shaped foodstuffs.** *Journal of Food Process Engineering* 16(3); 1993; 159-171

Heat conduction during cooking of foodstuffs with heterogeneous thermal properties was simulated, mainly for irregularly shaped geometries. A code employing boundary-fitted grids was implemented in a numerically conservative form (control vol. formulation). This technique consists of finding a numerical coordinate transformation which fits a regular grid to the domain of integration. With the grid as data, coeff. for a transformed differential equation are then obtained. The proposed model was experimentally verified on irregularly shaped pieces of beef containing a nonuniform distribution of fat. Relative errors between predicted and measured temp. were less than 2%. Effects of heat transfer coeff. and temp. of the cooking medium on temp. distribution during the process were analysed. Influence of different fat patterns was also considered. AA

1633

Awuah (GB), Ramaswamy (HS) and Simpson (BK). **Surface heat transfer coefficients associated with heating of food particles in CMC solutions.** *Journal of Food Process Engineering* 16(1); 1993; 39-57

The fluid-to-particle heat transfer coeff. (hfp) associated with the heating of cylindrical specimens of potato and carrot were evaluated in carboxymethylcellulose (CMC) solutions (0-1%) at 50-80°C. Average hfp values ranged from 80 to 450 W/m^{2}C for potatoes and 100 to 550 W/m^{2}C for carrots. Temp. and concn. of CMC influenced its power law parameters and hence hfp values, while fluid velocity (0.2 to 0.7 x 10^{-3} m/s), sample size (0.016-0.023 m diam., 0.02-0.04 m length) and flow direction (upward and downward) had marginal effects. Natural convection dominated the flow regime, giving good correlations between Nusselt and Rayleigh numbers. AA

1634

Peleg (M). **Assessment of a semi-empirical four parameter general model for sigmoid moisture sorption isotherms.** *Journal of Food Process Engineering* 16(1); 1993; 21-37

Published sigmoid moisture sorption isotherms ($0 < a_w <$ approx. 0.9) were fitted by the 4 parameter models $m = k_1 a_w^{n_1} + k_2 a_w^{n_2}$ where *m* is the moisture content (dry basis), a_w the water activity and the *k* and *n* values are constants ($n_1 < 1$ and $n_2 > 1$). The model had the same or better fit than the GAB model. In contrast with both the BET and GAB models, the proposed model is not based on the assumption that there exists a well-defined monolayer of absorbed water. At $a_w <$ approx. 0.4 and $n_1 >$ approx. 0.35, however, the model produces a practically linear $a_w/[m(1-a_w)]$ vs. aw plot, of the kind used to calculate the monolayer moisture with the BET model. The proposed model can be a convenient means to catalogue both sigmoid and nonsigmoid isotherms, and can be used to calculate equilibrium aw of dry [food] mixtures with equation solving software. AA

1635

Nasri (H), Simpson (R), Bouzas (J) and Torres (JA). **An unsteady-state method to determine kinetic parameters for heat inactivation of quality factors: conduction-heated foods.** *Journal of Food Engineering* 19(3); 1993; 291-301

The kinetic parameters (thermal death constant (calculated at 121.1°C) and z values) for heat inactivation of a quality factor in conduction-heated canned food were evaluated using the Complex optimization procedure and a numerical technique for heat-transfer calculations and quality-retention prediction. The jackknife method was used to evaluate experimental variability. This methodology was used to determine the thermal death constant (calculated at 121.1°C) and z values for thiamin destruction in pea puree (pH = 6.8, moisture content = 80.8%, and thermal diffusivity, $\alpha = 1.8 \times 10^{-7}$ m^2/s). Retort-processing experiments involving 303 x 406 cans filled with thiamin-enriched pea puree yielded a wide range of thamin-retention values (29-70%). Thermal death consant (calculated at 121.1°C) and z values were 304 plus/minus 32 min and 30 plus/minus 3°C, respectively. AA

1636

Alonso (AA), Perez (MRI), Shukla (NV) and Deshpande (PB). **On-line quality control of non-linear batch systems: application to the thermal processing of canned foods.** *Journal of Food Engineering* 19(3); 1993; 275-289

The recently developed Q-PI approach for quality control of linear continuous systems was extended to non-linear batch systems such as the thermal processing of canned foods. The new control law contains proportional and integral terms with which the operators are familiar. Quality control may be improved, or costs reduced, consistent with process specifications, by adjusting tuning constants of the controller. Performance of the control law is demonstrated on a simulated batch retort; results indicate the capability of the proposed approach for quality control of non-linear batch processes. AA

1637

Dohnal (M), Vystrcil (J), Dohnalova (J), Marecek (K), Kvapilik (M), Bures (P). **Fuzzy food engineering.** *Journal of Food Engineering* 19(2); 1993; 171-201

Classical quantitative (analytical and/or statistical) analyses are not appropriate for some ill-defined and/or very complex food engineering problems. Therefore, a new form of analysis using fuzzy mathematics was investigated. The fuzzy model utilizes data which, to a certain level, are inconsistent. To minimize losses of valuable knowledge, conventional pre-processing (usually statistical analysis) of knowledge is eliminated. Primary knowledge (e.g. experimental results) is used directly. Conventional experimental and other records used in food engineering are not suitable for efficient uncertainty reasoning. Revitalization of these records represents retrospective application of knowledge engineering algorithms. The final goal of revitalization is to insert additional information (e.g. expert guess) to increase reasoning power. 1 revitalization technique (fractal analysis) is presented. 2 realistic case studies (meat chilling and malt modification) are reported in detail. BV

1638

Hendrickx (M), Silva (C), Oliveira (F) and Tobback (P). **Generalized (semi)-empirical formulae for optimal sterilization temperatures of conduction-heated foods with infinite surface heat transfer coefficients.** *Journal of Food Engineering* 19(2); 1993; 141-158

A computer program was developed to model heat sterilization of 1-dimensional conduction-heated foods with negligible surface resistance to heat transfer. The optimal sterilization temp., defined as the processing temp. that results in a food product with min. surface cook-value after achieving the desired degree of sterility, was calculated as a function of food properties (thermal diffusivity, Z-value of the quality factor), processing conditions (dimensions and geometry of the food or container, initial temp. of the product, heating medium come-up-time) and processing criteria (target F_o-value). The initial temp. of the food and the heating medium come-up-time have a minor effect on the optimal temp. Generalized (semi)-empirical formulae relating optimal sterilization temp. and all relevant variables were developed. AA

1639

Liu (H) and Lamb (J). **Modelling of the diffusion process in food over short times.** *Journal of Food Engineering* 19(4); 1993; 311-318

A simple mathematical model was developed to describe the diffusion process [in foods] in an infinite cylinder, a sphere and finite cylinders. The error involved in using the proposed model over the dimensionless time 0-0.25 is negligible. It offers a simpler method of calculating the diffusion process than using full-series solutions. AA

1640

de Elvira (C). **The use of alternating direction implicit methods to model diffusion phenomena in elliptic products.** *Journal of Food Engineering* 19(2); 1993; 159-170

Three alternating direction implicit (ADI) methods plus the Crank-Nicolson implicit method and an 8-noded isoparametric finite element method (both included for comparison purposes) were considered to solve numerically transient thermal or mass diffusion problems in elliptic shaped bodies. 3 domain discretization methodologies were proposed: polar cylindrical; and unequally and equally spaced orthogonal curvilinear coordinates. To indirectly analyse the effectiveness of the methods in different discretizing techniques, they were applied to water diffusion during rice grain soaking; the computed solutions were compared with experimental ones. Influences of various time and space discretizations upon results were studied. Numerical stability constraints of some of the methods used and performance orientations on personal computer applications are given. AA

1641

Lee (JH) and Singh (RK). **Residence time distribution characteristics of particle flow in a vertical scraped surface heat exchanger.** *Journal of Food Engineering* 18(4); 1993; 413-424

Residence times of 1.0, 1.5 and 2.0 cm potato cubes with 0.4, 0.8 and 1.2% aqueous solutions of sodium carboxymethylcellulose and flow rates of 453, 534 and 599 ml/s in a vertical scraped surface heat exchanger (SSHE) rotating at 60, 110 and 160 rpm were measured, and distribution characteristics of particle flow for each set of conditions were investigated. Pearson's x^2 goodness of fit test indicated that most of the individual particle residence time distributions in a vertical SSHE flow could be described by the gamma model, whereas many of the individual distributions fitted to the normal model in addition to the gamma model for horizontal SSHE. Orientation of SSHE appeared to be the important factor influencing the forces acting on the particles during flow in an SSHE. Particle-particle interactions, as well as a combination of process parameters, caused 'tailing' of some particles, resulting in skewed distributions to the right. AA

1642

Ryniecki (A) and Jayas (DS). **Automatic determination of model parameters for**

computer control of canned food sterilization. *Journal of Food Engineering* 19(1); 1993; 75-94

A method was developed for automatic detn. (and updating using an optimization technique) of the step-response model parameters for computer control of the sterilization of canned heterogenous mixed foods. The step-analysis method was used in developing the mth order exponential lag model (including a dead-time delay) to predict product temp. changes in the slowest heating point of a can. An algorithm for computerized calculation of the heating model parameters is shown. The optimum gradient method was modified and used to fit the model more accurately to the temp. data measured during first few min of heating. Values of the cooling model parameters were calculated, based on fixed ratios of these parameters to values of the heating model parameters. The model was employed for prediction of the cumulative lethality contributed by the cooling portion of a sterilization process ($F^c o$). This lethality was used in heating turn-off decisions. The model is fast and accurate for the purpose. The max. running-time required to predict $F^c o$ in each time interval during sterilization of 9% bentonite suspension in a 400 x 470 (101.6 x 119.4 mm) size can was only 2.6 s (when an IBM-PC/AT-286/12 MHz microcomputer is used). The method was validated in the laboratory using 5-9% bentonite suspensions. The final monitored cumulative lethality was within 18% of the desired cumulative lethality for these suspensions. AA

1643

Mwangi (JM), Rizvi (SSH) and Datta (AK). **Heat transfer to particles in shear flow: application in aseptic processing.** *Journal of Food Engineering* 19(1); 1993; 55-74

Convective heat transfer coeff. at the fluid-particle interface were obtained for shear flow in a holding tube to simulate aseptic processing of particle-containing liquid foods. The particles were made of polymethyl methacrylate and were suspended in a solution of glycerin in water. Particle temp. were monitored by placing at the particle centre a m.p. indicator that changed colour at a specific temp. The fluid-particle heat transfer coeff. varied between 58.3 and 1301.3 W/m^2 K for Reynold numbers of 73.1 and 369.4, and increased with increasing flow rate and particle to tube diam. ratio. Heat transfer was enhanced between 80 and 200% when the solids concn. was increased to 3.22% from a single particle suspension. The density difference between the particle and fluid was found to influence significantly the residence time of the particles within the holding tube. AA

1644

Zaror (CA), Pyle (DL) and Molnar (G). **Mathematical modelling of an ohmic heating steriliser.** *Journal of Food Engineering* 19(1); 1993; 33-53

Sterilization processes based on electrical heating may overcome some of the problems associated with conventional thermal sterilization methods. However, there is a lack of appropriate mathematical models of the process for design and process control. Sterilization based on ohmic heating was studied from first principles, and the governing equations were used to predict performance under a range of conditions. A number of limiting cases were examined and simpler models were formulated. The advantages of the process over conventional sterilization were demonstrated; the performance of the system under unfavourable conditions as studied. AA

1645

Smirnov (MS), Lysenko (VI) and Yegorova (SV). **Research on cyclic grain drying.** *Journal of Food Engineering* 18(2); 1993; 201-210

Presents the results of a study of wheat grain drying in an experimental plant simulating a storage bin where bulk wheat grain was subjected to intermittent ventilation. Grain drying curves and temp. curves for 4 layers were obtained at depth intervals of 0.4 m. Approximate equations for the grain drying curves and a mathematical model of moisture content in the bulk grain were determined as well as heat and mass transfer equations. Results indicated that alternating periods of ventilation and rest reduced drying time to ~1/3 of that of the continuous-flow method. Energy consumption was reduced by a factor of > 5. BV

1646

Fryer (PJ), de Alwis (AAP), Koury (E), Stapley (AGF) and Zhang (L). **Ohmic processing of solid-liquid mixtures: heat generation and convection effects.** *Journal of Food Engineering* 18(2); 1993; 101-125

1647

Lovatt (SJ), Pham (QT), Loeffen (MPF) and Cleland (AC). **A new method of predicting the time-variability of product heat load during food cooling. II. Experimental testing.** *Journal of Food Engineering* 18(1); 1993; 37-62

An ordinary differential equation (ODE) method of predicting the heat load-time profile of cooling and freezing foods was developed and tested against finite difference (FD) predictions for a selection of shapes. To test both the FD calculation and the ODE method against reality, a technique was developed to measure freezing food product heat load in an experimental freezer using the difference in temp. between air flowing onto and off the product. Heat balances for experimental runs were generally within 10% of their expected values. When the FD and ODE heat load predictions for a meat carton shape were compared with measured data, predictions matched real values to within the experimental uncertainty. ODE heat release predictions for lamb and sheep carcasses were also within about 10% of experimental data during most of the process, although it was necessary to modify the value of the 1 new parameter in the ODE method to deal with such highly irregular shapes. AA

1648

Lovatt (SJ), Pham (QT), Cleland (AC) and Loeffen (MPF). **A new method of predicting the time-variability of product heat load during food cooling. I. Theoretical considerations.** *Journal of Food Engineering* 18(1); 1993; 13-36

A new method was developed to predict the way in which the heat load placed upon a refrigeration system by cooling food products varies with time. This information is important to refrigeration system designers and plant operators as capital and running costs may depend strongly upon the heat load sustained by the system. The new method utilizes ordinary differential equation models of both chilling and phase change processes and requires only 1 parameter in addition to those required by existing freezing and chilling time prediction methods. The new method was tested against finite difference (FD) calculations under a wide range of conditions for those product shapes to which FD methods may be applied. It predicted the product heat load to within 10% of the FD estimate for all test cases, except at the very start and at the end of the cooling process. The method requires much fewer computational resources than FD, and is capable of extension to shapes not easily handled by FD methods. AA

1649

Datta (AK). **Error estimates for approximate kinetic parameters used in food literature.** *Journal of Food Engineering* 18(2); 1993; 181-199

For convenience, the z-value has been traditionally used to describe temp. dependence of reaction rates in food materials. This approximate parameter, z, linearizes a more common non-linear relationship described by the Arrhenius equation for temp. dependence. Whereas researchers have been concerned about the range over which such approximate linear relationships may be valid, this study provides quantitative data to that effect for the first time. The nature and extent of error in using the z-value, as compared to the use of Arrhenius parameters, was mathematically analysed. It is shown that for every time-temp. history, there exists a unique reference temp. that minimizes this error. If 121°C is always used as the reference temp. instead, severe calculation errors are possible for higher temp. processes such as UHT processing and lower temp. processes such as inactivation of enzymes. A formula is proposed to preserve the full Arrhenius accuracy while still using the available z-values for reactions. AA

1650

Vagenas (GK) and Karathanos (VT). **Prediction of the effective moisture diffusivity in gelatinized food systems.** *Journal of Food Engineering* 18(2); 1993; 159-179

Gelatinized food systems develop a porous structure during dehydration; therefore, the moisture diffusivity calculated from experiments should be considered as an effective diffusion coeff. The effective moisture diffusivity of gelatinized starches was determined from drying experiments using the method of slopes. A methodology is presented which permits the calculation of the effective moisture diffusivity from the diffusion coeff. of the 2 phases (air-solid) and the porosity of the system. The diffusion coeff. of the homogeneous solid phase (gel) was estimated from the calculated values of the effective diffusion coeff., using non-linear regression analysis. Its value was dependent on the moisture content and temp. and varied in the range 1.4×10^{-11} to 2.6×10^{-10} m^2/s for Amioca [high amylopectin powder] and 4.1×10^{-11} to 3.2×10^{-10} m^2/s for Hylon 7. AA

1651

Hicsasmaz (Z) and Clayton (JT). **Applicability and comparison of various techniques for measurement of wettability and contact angles between oil-based liquid and starch-based solid food materials.** *Journal of Food Engineering* 18(2); 1993; 127-143

Contact angles of various oils and chocolate syrup were estimated on a commercial brand of white sandwich bread and a commercial brand of butter cookies using 3 different methods: sessile drop geometry; sedimentation vol.; and immersion techniques. It was concluded that estimation of contact angles from sessile drop geometry by photographic techniques is not possible for oils due to absorption into the starch-based solids. In such cases, sedimentation vol. and immersion techniques were practical methods for rough estimates of contact angles when needed. For the non-Newtonian chocolate syrup, estimation of contact angles with the starch-based solids by sedimentation vol. was not possible due to the yield stress of chocolate syrup. However, in this case, contact angles could be estimated for sessile drop geometry. AA

1652

Maltini (E). **Estimation of the viscosities of the frozen sucrose-water system from glass transition temperatures.** *Italian Journal of Food Science* 5(4); 1993; 371-377

Viscosities of the amorphous phase of sucrose-water solutions at sub-freezing temp. were estimated according to the glass transition theory. This was done by correlating concn., glass transition temp. and freezing temp. with the Williams-Landel-Ferry model, starting from literature data. The method and results are discussed with reference to the kinetic interpretation of stability in frozen systems. AA

Equipments

1653

Qin (Z) and Litchfield (JB). **Fuzzy logic control for a continuous crossflow grain dryer.** *Journal of Food Process Engineering* 16(1); 1993; 59-77

Assembly and performance of a fuzzy logic control system in regulating a laboratory continuous crossflow grain drier are described. With fuzzy control, similar outlet moisture contents and lower outlet breakage susceptibility of corn were obtained as compared to the manually controlled drier operation. Results verified that drying-induced corn breakage could be reduced through the application of fuzzy logic control. Like the corn drying process, many food processes are difficult to control automatically with conventional control techniques due to their complex nature. Fuzzy logic control provides an attractive solution for control of those processes. AA

1654

Das (H) and Srivastav (PP). **Process modelling on a novel grain roaster.** *Journal of Food Engineering* 19(4); 1993; 341-351

A manually operated device for roasting and puffing grains using hot sand was developed. A built-in sieve removed roasted grains and retained hot sand within the device. Moisture diffusivity in bengalgram during roasting was estimated to be 10×10^{-9} $m^2 s^{-1}$; the overall heat-transfer coeff. for heating sand with a liquefied petroleum gas was 12 $W m^{-2} K^{-1}$. Temp. of sand and the grain and sand mixture were determined using a lumped-heat-capacity model. Grain and sand temp. at the end of roasting, as predicted by the model, was between 207 and 222°C; measured values were from 201 to 205°C. The device roasted 4.2-4.9 kg h^{-1} of bengalgram; the value predicted by the model was 4.4-5.3 kg h^{-1}. BV

ENERGY IN FOOD PROCESSING

1655

Krishnappa (KG). **Study on electrical energy utilisation in roller flour milling industry.** *Indian Miller* 24(6); 1994; 16-20

Energy utilisation in roller flour milling - current status, energy accounting in wheat mills, factors contributing to higher specific energy (step down transformer, drives for roller flour mill machines), effects of partially loaded motors are discussed. SRA

FOOD CHEMISTRY AND ANALYSIS

Chemistry(Analytical)

1656

Martin (GJ), Hanneguelle (S) and Remaud (G). **Application of site-specific natural isotope fractionation studied by nuclear magnetic resonance (SNIF-NMR) to the detection of flavour and fragrance adulteration.** *Italian Journal of Food Science* 5(3); 1993; 191-213

Use of site-specific natural isotope fractionation studied by NMR (SNIF-NMR) for evaluating authentication of flavours and detecting adulteration is reviewed. Principles of the method are also described, together with its experimental requirements. Aspects covered include: isotopic fractionation - symbolism and definition; experimental methodology (sample treatment, NMR detn. of site specific isotope ratios); authentication of phenyl propanoid aromas; authentication of monoterpenic flavours and perfumes; and authentication of esters and lactones. BV

1657

Sievert (D) and Holm (J). **Determination of amylose by differential scanning calorimetry.** *Starch/Staerke* 45(4); 1993; 136-139

A DSC method for the detn. of amylose as its amylose-L-α-lysophosphatidylcholine (LPC) complex is described. Potato amylose/amylopectin mixtures covering the range 0-95% amylose were heated in the presence of LPC, cooled and then reheated to follow melting of the amylose-LPC complexes formed during the cooling phase. A linear relationship (r = 0.98) was obtained between the amylose content of the mixtures and enthalpies of amylose-lipid complexes. This linear calibration was used to predict the amylose content of various native starches, rice flours, wheat flour, durum wheat semolina and lyophilized raw potato on the basis of the melting enthalpy of their amylose-LPC complexes. Except for potato samples, amylose contents determined by the DSC method were in good agreement with those obtained from a colorimetric assay. AA

1658

Yukawa (N), Takamura (H) and Matoba (T). **Determination of total carbonyl compounds in aqueous media.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 881-884

Reports a method to quantify aldehydes carbonyl compounds in aqueous media. Analysis is based on the reaction of 2,4-dinitrophenylhydrazine (2,4-DNP) with aldehydes and the subsequent formation of the quinoidal ion under basic conditions. Aldehyde containing samples react with acidic 2,4-DNP reagent at 50°C for 30 min. The mixture is then cooled in an ice bath prior to addition of a 10% KOH/80% alcohol solution. Following centrifugation, the absorbance of the mixture is determined at 425 nm, from which the total carbonyl compounds content can be calculated. The method was applied to the detn. of total aldehydes in aqueous food media (milk, soymilk and soybean homogenates). BV

FOOD MICROBIOLOGY AND HYGIENE

1659

Krings (U), Kelch (M) and Berger (RG). **Adsorbents for the recovery of aroma**

compounds in fermentation processes. *Journal of Chemical Technology and Biotechnology* 58(3); 1993; 293-299

Using a model solution of 12 aroma compounds, (including aldehydes, alcohols, esters, ketones and pyrazines), representative of microbial volatiles, 31 different adsorptive materials were investigated with regard to their solid phase extraction and desorption properties. Well known styrene-divinylbenzene-based resins and alternative adsorbents including zeolites, β-cyclodextrin and modified activated carbon were compared. Adsorption and desorption rates in aqueous solution were determined for each adsorbent. Isotherms and adsorption kinetics were determined for the most effective adsorbents. Activated carbon had the highest adsorptive rates but a poor desorption capability when used with organic solvents. The next best materials were styrene-divinylbenzene resins and zeolite. They possessed adsorption rates similar to activated carbon but also good desorption rates. The relative properties of adsorbents for downstream processing of microbial fermentations are discussed. AA

1660

Nidetzky (B) and Steiner (W). **A new approach for modeling cellulase-cellulose adsorption and the kinetics of the enzymatic hydrolysis of microcrystalline cellulose.** *Biotechnology and Bioengineering* 42 (4); 1993; 469-479

Two fractions of substrate in microcrystalline cellulose which differ in their adsorption capacities for cellulases and their susceptibility to enzymic attack were identified. On the basis of a two-substrate hypothesis, mathematical models to describe enzyme adsorption and hydrolysis kinetics were derived. A new nonequilibrium approach was chosen to predict cellulase-cellulose adsorption. A max. binding capacity of 76 mg protein/g substrate and a half-max. saturation constant of 26 filter paper units (FPU)/g substrate were calculated, and a linear relationship of hydrolysis rate vs. adsorbed protein was found. The fraction of substrate more easily hydrolysed, as calculated from hydrolysis data, represented 19% of the total effective substrate concn. This fraction was only slightly different from that of other celluloses and was estimated to be 27 and 30% for NaOH- and H_3PO_4- swollen cellulose, respectively. The effective substrate concn. is equal to the max. amount of substrate which can be converted during exhaustive hydrolysis. This in turn is determined by overall degradability of the substrate by the cellulases (85-90% for microcrystalline cellulose) and by the cellobiose concn. during hydrolysis. The kinetic model is based on a summation of 2 integrated 1st-order reactions with respect to the effective substrate concn. It includes the principal factors influencing the reaction rates: the ratio of filter paper and β-glucosidase units/g substrate and the initial substrate concn. AA

Enzymes

1661

Jungbae (K) and Dordick (JS). **Pressure affects enzyme function in organic media.** *Biotechnology and Bioengineering* 42 (6); 1993; 772-776

Pressure effects on enzyme function in nonaqueous media were investigated. Activation vol. were determined and provide evidence that the primary effect of pressure is to enhance the stripping of water from an enzyme in polar organic solvents, leading to decreased enzymic activity. Activation vol. of subtilisin Carlsberg in organic solvents, particularly with hydrated enzyme, were of a larger magnitude than activation vol. determined in aqueous solutions. Results provide further evidence that enzymic activity in polar organic solvents is dominated by the interaction of enzyme-bound water with the solvent. From a practical standpoint, however, results suggest that enzymic catalysis in organic solvents may be controlled by the combined effects of pressure and enzyme hydration. AA

Ethyl alcohol

1662

Ohta (K), Hamada (S) and Nakamura (T). **Production of high concentrations of ethanol from inulin by simultaneous saccharification and fermentation using *Aspergillus niger* and *Saccharomyces***

cerevisiae. *Applied and Environmental Microbiology* 59(3); 1993; 729-733

Pure nonhydrolysed inulin was converted directly to ethanol in a simultaneous saccharification and fermentation process. An inulinase-hyperproducing mutant, *Aspergillus niger* 817, was grown in submerged culture at 30°C for 5 days. The inulin-digestive liquid culture (150 ml) was supplemented with 45 g of inulin, 0.45 g of $(NH_4)_2SO_4$, and 0.15 g of KH_2PO_4. The medium (pH 5.0) was inoculated with ethanol-tolerant *Saccharomyces cerevisiae* 1200 and fermented at 30°C. An additional 20 g of inulin was added after 15 h fermentation. *S. cerevisiae* 1200 utilized 99% of the 65 g of inulin during fermentation, and produced 20.4 and 21.0% (v/v) ethanol from chicory and dahlia inulins, respectively, after 3 days of fermentation. Max. volumetric productivities of ethanol were 6.2 and 6.0 g/l/h for chicory and dahlia inulins, respectively. The conversion efficiency of inulin to ethanol was 83-84% of the theoretical yield. AA

Fermented foods

1663

Ferng (S) and Chiou (RYY). **Characterization of white particulates in brine of indigenous fermented foods.** *Journal of Food Protection* 56(3); 1993; 243-245

White particulates are occasionally observed in brine of indigenous fermented foods, including sufu, salt-preserved shellfish, oyster, finfish and pork. Products with and without visible particulates were collected and brines were analysed. The pH, salinity and alcohol content in brines with particulates were slightly higher than those without particulates. Differences of amino acid profiles were not significant. When particulates were isolated and subjected to amino acid analysis, only tyrosine and phenylalanine were present and accounted for 34.82 plus/minus 24.30% and 3.13 plus/minus 2.93% on a dry wt. basis, respectively. The particulates studied by SEM consisted largely of hollow particles. When particulates were dissolved in 0.4N HCl, evaporated for crystallization, and examined using stereo microscopy and an X-ray diffractometer, L-tyrosine crystals were observed. AA

Microorganisms

Bacteria

1664

Donnison (AM), Ross (CM) and Russell (JM). **Quality control of bacterial enumeration.** *Applied and Environmental Microbiology* 59(3); 1993; 922-923

The use of standard bacterial suspensions to test method performance, via control charts and also to test inhibition of recovery of bacteria when analysing water samples is considered. Variability in standard suspensions prepared from different strains and spp. and the use of frozen samples for quality control of spore and bacteriophage analyses of water quality are discussed. BV

Bacillus

1665

Georganta (G), Kaneko (T), Nakamura (N), Kudo (T) and Horikoshi (K). **Isolation and partial properties of cyclomaltodextrin glucanotransferase-producing alkaliphilic *Bacillus* spp. from a deep-sea mud sample.** *Starch/Staerke* 45(3); 1993; 95-99

Cyclomaltodextrin glucanotransferase (CGTase EC 2.4.1.19) producing alkaliphilic bacteria were isolated from deep-sea bottom mud samples. Isolates no. 3-22 and no. 1-7 were identified from their taxonomic characteristics as an alkaliphilic *Bacillus* sp. and an alkaliphilic *B. subtilis* strain, respectively. Isolate no. 3-22 grew at 4°C whereas isolate no. 1-7 did not. The crude enzymes of both strains showed activity in both broad temp. and broad pH (5-9) ranges. Isolate no. 3-22 produced as its major starch hydrolysis product, β-cyclodextrin (β-CD), and as minor products, α- and γ-CD. Isolate no. 1-7 produced as its major starch hydrolysis product, β-CD, and as its minor product, γ-CD; no α-CD was detected. AA

1666

Yongxiang (W) and Saha (BC). **Purification and characterization of thermophilic and**

alkalophilic tributyrin esterase from *Bacillus* strain A30-1 (ATCC 53841). *Journal of the American Oil Chemists' Society* 70(11); 1993; 1135-1138

An extracellular esterase (EC 3.1.1.1.) from thermophilic *Bacillus* A30-1 (ATCC 53841) was purified 139-fold to homogeneity by 6M NaCl treatment, ammonium sulphate fractionation (30-80%) and phenyl-Sepharose CL-6B column chromatography. Native enzyme was a single polypeptide chain with mol. wt. of approx. 65 000 and an isoelectric point at pH 4.8. Optimum pH for esterase activity was 9.0 (stability range, pH 5-10.5). Optimum temp. for enzyme activity was 60°C. Half-life of esterase was 28 h at 50°C, 20 h at 60°C and 16 h at 65°C. Highest activity was observed on tributyrin, with little or no activity on long-chain (12-20 carbon) fatty acid esters. K_m and k_{cat} were 0.357mM and 8365/min, respectively, for tributyrin hydrolysis at pH 9 and 60°C. Cyclodextrin (α-, β and γ), Ca^{2+}, Co^{2+}, Mg^{2+} and Mn^{2+} enhanced esterase activity and Zn^{2+} and Fe^{2+} inhibited activity. EDTA, p-chloromercuribenzoate and N-bromosuccinimide had no effects on activity. BV

Bacillus amyloliquefaciens

1667

Castro (GR), Baigori (MD), Mendez (BS) and Sineriz (F). **Effects of pH and temperature on the continuous production of amylolytic enzymes by *Bacillus amyloliquefaciens* MIR-41.** *Journal of Chemical Technology and Biotechnology* 58(3); 1993; 277-280

Bacillus amyloliquefaciens MIR-41 produces 3 exocellular amylolytic enzymes: α-amylase, pullulanase and α-glucosidase. Physicochemical factors such as pH and temp. may affect enzyme yield. Continuous culture at a dilution rate of 0.15 h^{-1} resulted in the max. production of α-amylase and α-glucosidase at 36°C and pH 6.8 and of pullulanase at 44°C and pH 5.6. Results suggest that combinations of temp. and pH might be used for production of crude extracts of α-amylase or pullulanase. AA

Bacillus cereus

1668

Benedict (RC), Partridge (T), Wells (D) and Buchanan (RL). ***Bacillus cereus*: aerobic growth kinetics.** *Journal of Food Protection* 56(3); 1993; 211-214

Three strains of *B. cereus* [F4810, an emetic toxin producing strain isolated from cooked rice; B4AC, a diarrhoeal toxin producing strain isolated from pea soup; and T, a reference strain] were cultured in brain heart infusion medium aerobically under conditions of variable temp. (5 to 42°C), NaCl concn. (0.5-5%), pH (4.5-7.5) and sodium nitrite concn. (0-200 mg/l) to simulate conditions of normal and adverse food storage. Cultures were sampled at selected times, and plate counts were used to calculate growth curves for each condition. None of the strains grew at 5°C, but growth did occur slowly at 8°C, and was most rapid at 37°C. Growth occurred in media without additives at all pH examined between 8 and 42°C. Decreasing the pH and increasing NaCl and sodium nitrite levels increased the lag phase and generation times of the organism. AA

Bacillus licheniformis

1669

Shalini Sen and Satyanarayana (T). **Optimization of alkaline protease production by thermophilic *Bacillus licheniformis* S-40.** *Indian Journal of Microbiology* 33(1); 1993; 43-47

One hundred and twenty thermophilic bacterial strains isolated from soil, compost and ground water samples on glucose-yeast extract-asparagine medium at 50°C were screened for alkaline protease activity. Strain S-40, the most potent producer of alkaline protease was identified as *Bacillus licheniformis*. Among 11 media combinations, enzyme production was high in soybean meal-starch medium. Alkaline protease accumulation was better in fructose and starch than the other carbon sources. There was no enzyme secretion in inorganic nitrogen or asparagine. The age of the inoculum had no adverse effect on enzyme secretion. Alkaline protease production was optimum at pH 8.0, 45°C and 200 r.p.m. with 2% level of inoculum. AA

Lactobacillus bulgaricus

1670

Venkatesh (KV), Okos (MR) and Wankat (PC). **Kinetic model of growth and lactic acid production from lactose by *Lactobacillus bulgaricus*.** *Process Biochemistry* 28(4); 1993; 231-241

Batch and continuous fermentation kinetics of *Lactobacillus bulgaricus* were examined. The batch kinetic model included the effect of pH, product (lactic acid) and substrate (lactose). The effect of pH on the enzyme β-galactosidase was reflected in the value of mumax, Monod's growth constant. Empirical expressions to estimate model parameters based on pH were established. These were used to estimate cell mass and lactic acid concn. for fermentations without pH control. At high pH, lactic acid was mostly formed by growth associated mechanisms and at low pH it was due to cell maintenance. The relationship between ATP concn. and cell mass in a batch fermentation could be approximated by a Leudeking-Piret like relationship. Continuous fermentations were studied by varying pH and initial substrate conditions. Max. productivity of 6.2 g/l per h was obtained at pH 5.6 for the CSTR (continuous stirred tank reactor) system, which was 3x the productivity obtained for a batch system at the same pH. The CSTR system had a high productivity over a very small range of retention times. 3 stages were sufficient to completely utilize the lactose, but at the cost of decreasing productivity to 4.8 g/l per h. AA

Listeria monocytogenes

1671

Yeu (H-D) and Schaffner (DW). **Modeling the effect of temperature on the growth rate and lag time of *Listeria innocua* and *Listeria monocytogenes*.** *Journal of Food Protection* 56(3); 1993; 205-210

Several mathematical models which predict growth rate and lag time as a function of temp. were compared. Growth rate and lag time of *Listeria innocua* PFEI and *L. monocytogenes* Scott A PFEI were determined in brain heart infusion broth between 275 and 319 K. TableCurve 3.01 was used to fit model parameters to *L. monocytogenes* data and to evaluate growth rate and lag time models. Growth rate models were validated using *L. monocytogenes* data from real dairy food systems. *L. innocua* grew faster than *L. monocytogenes* at temp. < 315 K and slower at temp. > 315 K. At temp. < 281 K, lag time of *L. monocytogenes* was longer than that of *L. innocua*. The r^2 and F values show that 4-parameter growth rate models fit data better than 6-parameter models. The 4-parameter Zwietering Square Root Model gives the best fit of all models used to predict growth rate. The 2-parameter models predict lag time better than models containing more parameters. The 2-parameter Square Root Model gives the best fit of all the models evaluated when a traditional method of determining lag time is used. The 2-parameter New Model gives the best fit of all models, when the Solberg method of determining lag time is used. 4 growth rate models are not only suitable for modelling growth rate of *L. monocytogenes* in brain heart infusion broth but are also suitable for modelling its growth rate in selected real dairy food systems. AA

Thermomonospora viridis

1672

Muramatsu (Y), Takahashi (K) and Nakamura (N). **Characterization of a maltogenic amylase of *Thermomonospora viridis* and application in branched cyclodextrin production.** *Starch/Staerke* 45(3); 1993; 99-104

Some kinetic characteristics and actions on various cyclodextrins (CD) of a maltogenic α-amylase of *Thermomonospora viridis* (TVA; EC 2.4.1.1) were examined in branched CD production. K_m values for hydrolysis of α-, β- and γ-CD by the enzyme were 6.5, 7.6 and 10.8mM, and apparent molecular activities (Kθ) for these saccharides were 11.0, 67.2 and 432.8 s^{1}, respectively. Kθ values for various branched CD were remarkably smaller than those for unbranched CD. The TVA cleaved first the ring of maltosyl-β-CD; the branched nonasaccharide formed was immediately degraded to give branched hexa- and penta-saccharides with simultaneous formation of smaller unbranched saccharides. The enzyme also released a glucose molecule from the side chain of maltosyl-β-CD to give glucosyl-β-CD which was readily degraded to smaller saccharides. α-Amylase from *T. viridis* had an ability to hydrolyse unbranched CD preferentially in the presence of significant amounts of branched CD. These characteristics of the enzyme are consistent with its potential industrial use in branched CD production. AA

Fungi

Aspergillus

1673

Pitt (JI). **Corrections to species names in physiological studies on *Aspergillus flavus* and *Aspergillus parasiticus*.** *Journal of Food Protection* 56 (3); 1993; 265-269

A review of papers reporting physiological studies on the aflatoxin producing fungi *Aspergillus flavus* and *Asp. parasiticus*. 49 references. CSA

Rhizopus arrhizus

1674

Federici (F), Moresi (M), Parente (E), Petruccioli (M) and Piccioni (P). **Effect of stirring rate and neutralising agent on fumaric acid production by Rhizopus arrhizus.** *Italian Journal of Food Science* 5(4); 1993; 387-396

The optimal operating conditions for fumaric acid production by Rhizopus arrhizus from commercial hydrolysates of corn starch (i.e. glucose molasses) in shake flasks were transferred to a laboratory-stirred fermenter and checked with respect to the impeller speed (n) and neutralizing reagent added to control the pH of the medium. Regardless of the impeller speed in the range 450-1000 rpm, fumaric acid excretion was regarded as a non-growth associated process, because the mycelial biomass concn. in the production medium remained almost constant. When using $CaCO_3$ to control the pH, it was possible to reproduce satisfactorily the fumaric acid yields observed in the shake flasks only by increasing n from 450 to 800 rpm. Then, a soluble alkaline reagent (8M KOH + 1M K_2CO_3) was used to control the pH so as to minimize the heavy foam formation problems due to calcium fumarate production. Even if this procedure resulted in a higher yield factor for acid formation, the experimental fumaric acid yield coeff. practicaly coincided with those observed at n = 800 rpm in the presence of $CaCO_3$, thus making it useless to increase the stirrer speed to 1000 r.p.m. AA

Yeasts

1675

Martin (AM), Acheampong (E) and Patel (TR). **Production of astaxanthin by *Phaffia rhodozyma* using peat hydrolysates as substrate.** *Journal of Chemical Technology and Biotechnology* 58(3); 1993; 223-230

Peat hydrolysates prepared with and without acid and under various temp. were tested for the growth of the yeast *P. rhodozyma* ATCC 24202, which synthesizes carotenoids, including astaxanthin. The hydrolysate that resulted in the best growth of *P. rhodozyma* biomass was subsequently used as substrate for submerged culture of the yeast, and growth conditions were optimized. Conditions studied included initial substrate concn., initial pH, incubation temp., fermentation time and agitation rate. Optimum growth conditions produced approx. 4.6 g dm^{-3} of dry biomass with a crude protein content of 47% (dry wt. basis). The mean astaxanthin content of the yeast cultivated under these conditions, 1567 $\mu g\ g^{-1}$ dry yeast, was also the highest produced in this study, and compared favourably with results from the literature. AA

1676

Arica (MY) and Hasirci (V). **Immobilization of glucose oxidase: a comparison of entrapment and covalent bonding.** *Journal of Chemical Technology and Biotechnology* 58(3); 1993; 287-292

Glucose oxidase [EC 1.1.3.4, from Aspergillus niger] was immobilized onto poly(2-hydroxyethyl methacrylate) (pHEMA) membranes by 2 methods: by covalent bonding through epichlorohydrin and by entrapment between pHEMA membranes. Highest immobilization efficiencies were 17.4 and 93.7% for covalent bonding and entrapment, respectively. K_m values were 5.9, 8.8 and 12.4 mmol dm^{-3} for free, bound and entrapped enzyme, respectively. V_{max} values were 0.071, 0.067 and 0.056 mmol dm^{-3} min^{-1} for free, bound and entrapped enzyme, respectively. When the medium was saturated with O_2, K_m was not significantly altered but V_{max} was. Optimum pH values for free, covalently-bound and entrapped enzyme were 5, 6 and 7, respectively. Optimum temp. was 30°C for free or covalently-bound enzyme but 35°C for entrapped enzyme. The deactivation constant for bound enzyme was 1.7×10^{-4} min^{-1} and 6.9×10^{-4} min^{-1} for entrapped enzyme. AA

1677

Hay (JD). **Novel yeast products from fermentation processes.** *Journal of Chemical Technology and Biotechnology* 58(2); 1993; 203-205

Novel products of interest to the food industry obtained from yeast fermentations are considered. They include enzymes (invertase, lactase or beta-galactosidase, recombinant enzymes including chymosin); nutrients and functional food ingredients (proteins, minerals, group B vitamins, emulsifiers and stabilizers); flavourings (yeast extract, umami); and yeasts as food colourings (including *Phaffia*, *Rhodotorula*, *Cryptococcus* and *Sporobolomyces*, yeast cell colours range from yellow to red). BV

1678

El Sharkawy (SH), Dostal (L) and Rosazza (JPN). **Microbiological transformations of lipids: acyl-specific hydrolysis of lard by yeasts.** *Applied and Environmental Microbiology* 59 (3); 1993; 725-728

Fatty acid and positional specificities of *Saccharomyces cerevisiae* (UI-SACCH) and *Schizosaccharomyces octosporus* (NRRL Y-854) in the hydrolysis of lard were studied by using GLC. Synthetic triglycerides were used to determine positional specificities of lipases of both organisms. Palmitic acid was specifically cleaved from all 3 triglyceride ester positions by *Sacch. cerevisiae*, while *Schizosacch. octosporus* cleaved stearic acid at either position 1 or position 3 of the glycerol moiety. Preparative scale fermentation with 200 g of lard per l yielded 48.4 g of palmitic acid per l with *Sacch. cerevisiae* and 42 g of stearic acid per l with S. octosporus. The free fatty acids produced by microbiol bioconversion of lard were characterized spectrally (-1H- and CNMR and MS) and chromatographically (TLC and GC). AA

Candida cylindracea

1679

Tanaka (Y), Funada (T), Hirano (J) and Hashizume (R). **Triglyceride specificity of *Candida cylindracea* lipase: effect of docosahexaenoic acid on resistance of triglyceride to lipase.** *Journal of the American Oil Chemists' Society* 70(10); 1993; 1031-1034

Tuna oil was hydrolysed with *Candida cylindracea* lipase. After 70% hydrolysis of the oil, the docosahexaenoic acid (DHA) content in the glyceride mixture [a mixture of TG (triglyceride), DG (diglyceride) and MG (monoglyceride)] was twice that of the original oil. DHA-rich TG and DG were observed, but DHA-rich MG was absent. *C. cylindracea* lipase appeared to have a 'triglyceride specificity', and it favours TG without DHA over TG containing DHA. In accordance with this hypothesis, TG containing a mixture of oleic acid (OA) and DHA was synthesized and then hydrolysed with *C. cylindracea* lipase. TGs in the hydrolysis product were fractionated and analysed quantitatively by HPLC. 4 kinds of TG were obtained. TG with 3 molecules of OA was hydrolysed most easily. Increasing the DHA content of TG resulted in less hydrolysis of TG. The results suggested that *C. cylindracea* lipase had a TG specificity for the whole structure of TG in preference to the individual ester bonds; OA coexisting with DHA in TG was resistant to *C. cylindracea* lipase due to the TG structure. AA

Kluyveromyces marxianus

1680

Harsa (S), Zaror (CA) and Pyle (DL). **Production of polygalacturonases from *Kluyveromyces***

***marxianus* fermentation: preliminary process design and economics.** *Process Biochemistry* 28(3); 1993; 187-195

A simple 1-stage downstream processing scheme for recovery of polygalacturonase from *K. marxianus* fermentation is described. The optimum pH for ion exchange was 4.5, which, being compatible with fermentation conditions, meant that broth could be centrifuged and directly applied to an ion-exchange column; the process resulted in > 90% recovery of highly purified enzyme. Economic analysis of a repeated batch process showed that recovery of other by-products (cells and ethanol) was only of marginal importance, whilst enzyme production was highly profitable. There were strong economies of scale, up to a fermentation batch scale of around 20 m^3, with 100 batches per yr. Under typical conditions, analysis predicted a payback time < 1 yr. AA

BIOTECHNOLOGY

1681

Sashihara (N), Nakamura (N) and Horikoshi (K). **Subcloning and nucleotide sequencing of the pul gene of *Thermus* sp. AMD-33.** *Starch/Staerke* 45(4); 1993; 144-150

The nucleotide sequence of a thermostable pullulanase (pullulan 6-glucanohydrolase, EC 3.2.1.41) gene pul of *Thermus* sp. AMD-33 was determined. A single open reading frame of 2154 bp was found which encodes a protein of mol. wt. 80 327. Pullulanase purified from an *Escherichia coli* transformant harbouring the plasmid-encoded pul gene had a mol. wt. of 81 000 Da, as determined by SDS-PAGE. The plasmid-encoded enzyme was inhibited by pCMB, however, activity was recovered after treatment with 2-mercaptoethanol. The N-terminal region of the amino acid sequence was almost identical to that deduced from the DNA sequence. No signal peptide-like sequence could be detected. Amino acid sequence analysis revealed that 4 regions out of 6 which are characteristically found in amylases were conserved in the plasmid-borne pullulanase, but no amylase activity could be detected. AA

1682

Arica (MY), Sharif (FA), Alaeddinoglu (NG), Hasirci (N) and Hasirci (V). **Covalent immobilization of *Aspergillus niger* on pHEMA membrane: application to continuous flow reactors.** *Journal of Chemical Technology and Biotechnology* 58(3); 1993; 281-285

Poly(2-hydroxyethyl methacrylate) (pHEMA) membrane was prepared via photopolymerization and activated with epichlorohydrin. Conidia of *Aspergillus niger* (wild type NRRL-3 and genetically improved strain NRRL-3/2-2A) were covalently immobilized on the membranes. The uniform growth of *A. niger* cells on membrane surfaces was verified by SEM. Glucose oxidase (GOD) activity of immobilized cells was determined in a continuous flow membrane reactor (CFMR) by assaying for hydrogen peroxide produced. The activity was also determined in culture fluids of *A. niger* strains, freely grown in batch cultures. The CFMR was run with 0.1 mol dm^{-3} glucose with a fixed flow rate of 20 cm^3 h^{-1} for 60 h during which a 10% loss of original activity was detected. Loss of activity with freely cultivated mycelia was about 50% after 30 h. GOD activity of strain NRRL-3/2-2A was about 20x higher whether in immobilized or in free form. GOD activity of immobilized *A. niger* strains in the CFMR was 2.5x better than their counterparts freely grown in batch cultures inducating that immobilization increases the GOD activity and the stability of these microorganisms. AA

1683

Paavilainen (S), Hellman (J) and Korpela (T). **Purification, characterization, gene cloning, and sequencing of a new β-glucosidase from *Bacillus circulans* subsp. *alkalophilus*.** *Applied and Environmental Microbiology* 59(3); 1993; 927-932

An intracellular β-glucosidase was purified from cell extracts of *Bacillus circulans* subsp. alkalophilus by NAD affinity and high performance anion -exchange chromatographies. The enzyme was active against a wide range of aryl-β-glucosides and β-linked disaccharides. The structural gene for β-glucosidase was cloned in *Escherichia coli*. The β-glucosidase gene consisted of an open reading frame of 1350 bp encoding a protein of

450 amino acids with a calculated Mr of 51 303. The enzyme exhibited from 45 to 66% identity with 5 bacterial β-glucosidases. AA

1684

Van Rijssel (M), Smidt (MP), Van Kouwen (G) and Hansen (TA). **Involvement of an intracellular oligogalacturonate hydrolase in metabolism of pectin by *Clostridium thermosaccharolyticum*.** *Applied and Environmental Microbiology* 59(3); 1993; 837-842

The enzymes pectin methylesterase and polygalacturonate hydrolase, which are responsible for the initial steps of pectin degradation by *Cl. thermosaccharolyticum*, were induced on the polymeric substrates pectin and pectate, and on oligogalacturonates, but were repressed in the presence of glucose. Digalacturonate and trigalacturonate produced by the extracellular pectin methylesterase-polygalacturonate hydrolase complex were transported across the cytoplasmic membrane and hydrolysed by an inducible oligogalacturonate hydrolase to galacturonate. The oligogalacturonate hydrolase was separated from the polygalacturonate hydrolase and characterized. Its temp. optimum was 65°C, and its pH optimum was 6. The native molecular size was 90 kDa, and the enzyme was stable for greater than 1 h at 65°C. The max. reaction rate on oligomers decreased with increasing degree of polymerization. Galacturonate was released by hydrolysis from the nonreducing end of the oligomer. Amounts of pectic enzymes produced were all correlated to the amount of biomass formed. Galacturonate was metabolized via a modified Entner-Doudoroff route. AA

1685

Van Rijssel (M), Gerwig (GJ) and Hansen (TA). **Isolation and characterization of an extracellular glycosylated protein complex from *Clostridium thermosaccharolyticum* with pectin methylesterase and polygalacturonate hydrolase activity.** *Applied and Environmental Microbiology* 59(3); 1993; 828-836

An extracellular protein complex was isolated from the supernatant of a pectin-limited continuous culture of *Cl. thermosaccharolyticum* Haren. The complex possessed both pectin methylesterase (EC 3.1.1.11) and exo-poly-α-galacturonate hydrolase (EC 3.2.1.82) activity and produced digalacturonate from the nonreducing end of pectin chains. The protein consisted of 230- and 25-kDa subunits. The large subunit contained 10% (wt./wt.) sugars (N-acetylgalactosamine and galactose). Under physiological conditions both activities acted in a coordinated manner: the ratio between methanol and digalacturonate released during degradation was constant and equal to the degree of esterification of the pectin used. Prolonged incubation of the enzyme with pectin led to a nondialysable fraction that was enriched in neutral sugars, such as arabinose, rhamnose, and galactose; the high rhamnose/galacturonic acid ratio was indicative of hairy region-like structures. The smallest substrate utilized by the hydrolase was a tetragalacturonate. V_{max} with oligogalacturonates increased with increasing chain length. K_m and V_{max} values for the polygalacturonate hydrolase with citrus pectate as a substrate were 0.8 g l^{-1} and 180 μmol min^{-1} mg of $protein^{-1}$, respectively. K_m and V_{max} for the esterase with citrus pectin as a substrate were 1.2 g l^{-1} and 440 μmol min^{-1} mg of $protein^{-1}$, respectively. Temp. optima for the hydrolase and esterase were 70 and 60°C, respectively. Both enzyme activities were stable for greater than 1 h at 70°C. The exo-polygalacturonate hydrolase of *Cl. thermosulfurogenes* was partially purified while the methylesterase was also copurified. AA

1686

Heery (DM) and Dunican (LK). **Cloning of the trp gene cluster from a tryptophan-hyperproducing strain of *Corynebacterium glutamicum*: identification of a mutation in the trp leader sequence.** *Applied and Environmental Microbiology* 59(3); 1993; 791-799

Corynebacterium glutamicum ATCC 21850 produces up to 5 g of extracellular L-tryptophan per l in broth culture and displays resistance to several synthetic analogues of aromatic amino acids. Cloning of the tryptophan biosynthesis (trp) gene cluster of this strain on a 14.5-kb BamHI fragment is reported. Subcloning and complementation of *Escherichia coli* trp auxotrophs revealed that as in *Brevibacterium lactofermentum*, the *C. glutamicum* trp genes are clustered in an operon in the order trpE, trpD, trpC, trpB, trpA. The cloned fragment also confers increased resistance to the analogues 5-methyltryptophan and 6-fluorotryptophan on *E. coli*. The sequence of the ATCC 21850 trpE gene revealed no significant changes when compared to the trpE sequence of a wild-type strain reported previously. However, analysis of the promoter-regulatory region revealed a nonsense (TGG-to-TGA) mutation in the third of 3 tandem Trp codons present within a trp leader gene. PCR amplification and sequencing of the corresponding region confirmed the absence of this mutation in the wild-type strain. RNA secondary-structure predictions and sequence similarities to the *E. coli* trp attenuator suggest that this mutation results in a constitutive antitermination response. AA

1687

Davis (R), van der Lelie (D), Mercenier (A), Daly (C) and Fitzgerald (GF). **ScrFI restriction-modification system of *Lactococcus lactis* subsp. *cremoris* UC503: cloning and characterization of two ScrFI methylase genes.** *Applied and Environmental Microbiology* 59(3); 1993; 777-785

Two methylase genes from total genomic DNA of the dairy starter culture *Lactococcus lactis* subsp. *cremoris* UC503, encoding ScrFI modification enzymes, were cloned and expressed in *Escherichia coli*. No homology between the 2 methylase genes was detected. Inverse PCR of flanking chromosomal DNA indicated that both were linked on the *Lactococcus genome*. Neither clone encoded the cognate endonuclease. The DNA sequence of 1 of the methylase genes (encoded by pCI931M) was determined and consisted of an open reading frame 1170 bp long, which could encode a protein of 389 amino acids (Mr, 44 500). The amino acid sequence contained the highly characteristic motifs of an m-5C methylase. Extensive regions of homology were observed with the methylases of NlaX, EcoRII, and Dcm. AA

1688

Jian (J-Z), Fujiyama (K), Seki (T) and Yoshida (T). **On-line monitoring of cell concentration of *Perilla frutescens* in a bioreactor.** *Biotechnology and Bioengineering* 42(4); 1993; 542-546

In situ real-time monitoring of *P. frutescens* biomass in a bioreactor was studied using a laser turbidimeter. Turbidity measurements at 780 nm with the laser sensor were hardly affected by the red colour of the anthocyanin produced by *P. frutescens* cells, nor by the aeration rate or agitation speed of the bioreactor. There was a linear relationship ($r^2 > 0.99$) between the sensor's response and cell concn. Each growth stage of the cells, i.e., lag, logarithmic, and stationary phases, could be estimated online by means of the *in situ* turbidimeter. However, during the declining phase of cells, an apparent deviation was observed between online estimations and off-line measurements of cell concn. by dry cell wt. This deviation was caused by a decrease in cell density due to an increase of individual cell volume and a decrease of cell dry wt. during the declining phase. AA

1689

Prazeres (DMF), Lemos (F), Garcia (FAP) and Cabral (JMS). **Modeling lipolysis in a reversed micellar system. II. Membrane reactor.** *Biotechnology and Bioengineering* 42(6); 1993; 765-771

Olive oil hydrolysis using *Chromobacterium viscosum* lipase B in a reversed micellar media was investigated in a membrane reactor. The dynamic evolution of product concn. both in the concentrate and permeate stream was analysed using a mechanistic model. A kinetic law with a 2nd-order dependence on substrate concn. and nonlinear product inhibition best described hydrolysis data over an extensive range of time and substrate concn. Results are discussed in terms of specific interactions occurring in the membrane reactor. AA

1690

Prazeres (DMF), Lemos (F), Garcia (FAP) and Cabral (JMS). **Modeling lipolysis in a reversed micellar system. I. Conventional batch**

reactor. *Biotechnology and Bioengineering* 42(6); 1993; 759-764

Triglyceride hydrolysis using Chromobacterium viscosum lipase B in a reversed micellar media was investigated in a batch-type reactor. The dynamic evolution of product concn. was analysed using several mechanistic models. A kinetic model with nonlinear product inhibition best described batch hydrolysis data over an extensive range of time and substrate concn. The rate equation obtained described the time course of reactions performed in this work, at different water contents (W_o = 7, 24) and pH values, and also experimental results obtained from the literature with a *Candida rugosa* lipase. AA

1691

Harcum (SW) and Bentley (WE). **Response dynamics of 26-, 34-, 39-, 54-, and 80-kDa proteases in induced cultures of recombinant *Escherichia coli*.** *Biotechnology and Bioengineering* 42(6); 1993; 675-685

Heterologous protein in recombinant *Escherichia coli* elicits a response similar to the heat-shock response, which includes enhanced proteinase expression. The present work detects, quantifies and characterizes intracellular proteinase activity in *E. coli* that were 'shocked' by the induction of a recombinant protein, CAT [chloramphenicol acetyltransferase], which is an endogenous protein in some *E. coli* strains. A SDS-gelatin-PAGE method was used to detect, quantify and characterize the presence of the proteinases. A hypothesis is proposed which links amplified proteinase activity to a temporary depletion of specific amino acid pools, and a stringent-like stress response. AA

1692

Ong (E), Gilkes (NR), Miller (RCJr), Warren (RAJ) and Kilburn (DG). **The cellulose-binding domain (CBDCex) of an exoglucanase from *Cellulomonas fimi*: production in *Escherichia coli* and characterization of the polypeptide.** *Biotechnology and Bioengineering* 42(4); 1993; 401-409

The gene fragment encoding the cellulose-binding domain (CBD) of an exoglucanase (Cex) from *Cellulomonas fimi* was subcloned and expressed in *E. coli*. Transcription from the lac promoter coupled with translation from a consensus prokaryotic ribosome binding site led to the production of large quantities of CBDCex (up to 25% total soluble cell protein). The polypeptide leaked into the culture supernatant (up to 50 mg l^{-1}), facilitating 1-step purification by affinity chromatography on cellulose. The 11-kDa polypeptide reacted with Cex antiserum. Absence of free thiols indicated that the 2 Cys residues of CBD_{Cex} form a disulphide bridge. It had the same N-terminal amino acid sequence as CBD_{Cex} prepared from Cex by proteolysis, plus 2 additional N-terminal amino acid residues (Ala and Ser) encoded by the N_{hel} site introduced during plasmid construction. CBD_{Cex} bound to a variety of β-1,4-glycans with different affinities and saturation levels. Adsorption to bacterial microcrystalline cellulose was dependent on temp., but not on pH. AA

TISSUE CULTURE

1693

Kurata (H) and Furusaki (S). **Immobilized *Coffea arabica* cell culture using a bubble-column reactor with controlled light intensity.** *Biotechnology and Bioengineering* 42(4); 1993; 494-502

FOOD ADDITIVES

Nil

CEREALS

Quinoa

1694

Ruales (J), Valencia (S) and Nair (B). **Effect of processing on the physico-chemical characteristics of quinoa flour (*Chenopodium quinoa*, Willd).** *Starch/Staerke* 45(1); 1993; 13-19

The nature and extent of the modification of starch in quinoa due to various processes such as cooking and autoclaving of the seeds, drum drying of the flour and extrusion of the grits were investigated by measuring physicochemical properties - water absorption, water solubility, swelling power, viscosity and degree of gelatinization - of processed samples. Autoclaved samples showed the lowest degree of gelatinization (32.5% by DSC) of starch, while the degree of gelatinization of the precooked/drum dried samples was 97.4% by DSC. Higher polymer degradation was observed in cooked samples than in autoclaved samples as determined by gel chromatography. The water solubility of cooked samples (5.44-15.58) and autoclaved samples (7.02-9.64) increased with process time. In the extrusion process, the moisture content as well as the compression ratio significantly ($P < 0.01$) affected degree of starch modification. BV

Rice

1695

Murugesan (G) and Bhattacharya (KR). **Interrelationship between some structural features of paddy and indices of technological quality of rice.** *Journal of Food Science and Technology (India)* 31(2); 1994; 104-109

Data on structural features of 25 var. of paddy revealed that grain breadth was positively correlated with white belly (chalkiness on ventral side) and negatively with the tightness of husk interlocking. The latter could be indexed inversely by the ease of shelling of paddy; but shellability was influenced positively by grain breadth also. Rice hardness was adversely affected by grain chalkiness, but hardness also differed among var. due to other reasons. Grain cracking was correlated positively with grain chalkiness and negatively with grain hardness and husk interlocking score. A max. brown rice breadth of 2.3 mm, a max. shellability of 75% and a min. popping expansion of 12 times could be useful as simple screening indices for acceptable technological quality of rice and for rapid screening of breeding lines. AA

1696

Madhuri Kelkar, Pratima Shastri and Rao (BY). **Microscopic structure and carbohydrate digestibility of ready-to-eat puffed rice products.** *Journal of Food Science and Technology (India)* 31(2); 1994; 110-113

In vitro carbohydrate digestibility of ready-to-eat puffed products from rice, such as *lahi* (puffed paddy), *poha* (beaten rice), *murmura* (puffed rice), and *chiwdi* (puffed poha), was determined using pancreatic and salivary amylases, separately. It was found that puffing enhanced the digestibility, as against the decrease in case of flaking. The data on the extent of starch gelatinization in these products indicated that gelatinization was a pre-requisite for puffing and also for increase in digestibility. However, gelatinization was not the only factor in enhancing digestibility of puffed products. Microscopic studies on the structure of these products gave interesting trends. AA

1697

Amarjeet Kaur and Sekhon (KS). **Evaluation of nutritional quality of parboiled rice.** *Journal of Food Science and Technology (India)* 31(2); 1994; 162-164

Feeding trials were conducted on albino rats for 28 days using reference casein diet, raw rice diet and the diets based on pressure parboiled rice as well as traditionally parboiled rice. Protein efficiency ratio (PER) did not vary significantly for different groups. However, PER value was the highest for rats fed on casein diet, followed by raw rice diet, pressure parboiled rice diet and traditionally parboiled rice diet respectively. AA

1698

Grenus (KM), Hsieh (F) and Huff (HE). **Extrusion and extrudate properties of rice flour.** *Journal of Food Engineering* 18(3); 1993; 229-245

Rice flour was extruded with a fully intermeshing, co-rotating twin-screw extruder (APV Baker MPF50/25). Rice bran was added at levels of 10, 20 and 30%. All treatments were run at screw speeds of 200 and 300 r.p.m. Both specific energy and product temp. in the metering section decreased on addition of rice bran and increased at the higher screw speed. Both radial and axial expansion increased at 10% rice bran and decreased at higher levels. Shear strength increased with bran levels greater than 10% and with increase in screw speed. Extrudates that contained bran were darker than those that did not. An examination of the puff microstructure showed an increase in structural organization at 10% rice bran levels and decreased cell size and incomplete cells at higher levels. AA

1699

Seow (CC) and Thevamalar (K). **Internal plasticization of granular rice starch by hydroxypropylation: effects of phase transitions associated with gelatinization.** *Starch/Staerke* 45(3); 1993; 85-88

At a 1:1 starch/water ratio, a progressive shift of biphasic gelatinization endotherms to lower temp. as well as a broadening and shortening of the G endotherm with increasing molar substitution were observed, indicating increased internal plasticization and destabilization of the amorphous regions of the starch granules. Overall enthalpy of gelatinization was also reduced. Hydroxypropyl groups, which are attached to starch molecules primarily in the amorphous regions of starch granules, behave as flexible side chains. The motion of these side chains creates a large amount of free vol., thereby lowering the glass transition and crystallite melting temp. associated with starch gelatinization. Modified starch granules may thus be viewed as internally plasticized polymer resins which are more easily gelatinized than the unmodified starch. AA

1700

Nishimura (K), Kida (K), Nakagawa (M), Yahata (K) and Sonoda (Y). **Production of spirit from crushed rice by non-cooking fermentation using a bench-scale plant.** *Process Biochemistry* 28(3); 1993; 147-153

A non-cooking-fermentation (NCF) system was evaluated for rice spirits using both small-scale and bench pilot-scale equipment. The system utilized a commercially available fungal enzyme from Rhizopus as the saccharifying agent together with citric acid. Fermentation was optimized for both temp. and seed inoculum size. Fermentation products from bench-scale equipment were distilled under vacuum or atm. conditions and distillates were assessed by a taste panel. Distillates produced under atm. conditions from NCF compared favourably with those produced from cooking-fermentation. This method of production results in significant savings of labour and energy if operated on a production scale. BV

Wheat

1701

Balasubramanyam (N) and Murali Krishna (V). **Sorption characteristics and packaging of milled wheat products.** *Indian Miller* 24(6); 1994; 33-39

Studies on moisture, sorption at 27°C, RH 11-92%, packaging (HDPE, LDPE) and storage of wheat and wheat products (*atta* - whole wheat flour, maida, soji) indicated that moisture content of 12% for wheat, and 13% for *atta*, maida and soji were critical with respect to keeping quality; and that products packed in LDPE had 30-40 days storage life at 90% RH, 38°C, and 105 days at 65% RH, 27°C. SRA

1702

Greevani (P). **Wheat products consumer perspectives and requirements.** *Indian Miller* 23(5); 1993; 34-36

Compared to rice, coarse grains, other cereals and pulses the contribution of wheat to the total food grains is shown to increase consistently from 1950-51 to 1987-88. From the production and procurement of wheat from 1982-83 to 1984-85 it is estimated that wheat production will touch 74 t by 2000 AD. along with the above, growing urbanisation, nutrition and health awareness wheat products need to be modified to suit the taste and purchase power of consumers. Quality atta, maida, suji, var. of breads, biscuits, pastes, pizzas, breakfast and snack foods should be provided. SD

1703

Ryu (GH) and Walker (CE). **Emulsifer effects on pasting properties of wheat flour extrudates with/without sucrose and shortening.** *Starch/Staerke* 45(2); 1993; 65-70

Ground extrudate pasting properties were measured in the rapid viscoanalyser (RVA). 4 pasting parameters were determined from the RVA curve: peak time (PT), peak viscosity (P), breakdown viscosity (H) and initial slope (IS). Emulsifier types and the addition of sucrose and shortening significantly affected PT, P, H and IS. Emulsifiers significantly increased PT and H and decreased P and IS. Glyceryl monostearate had the greatest effects on these parameters. Sucrose and shortening generally enhanced the effects of emulsifiers on pasting properties. BV

1704

Lorenz (K), Kulp (K), Every (D) and Larsen (N). **Effect of heat damage on the baking quality of starch extracted from wheat.** *Starch/Staerke* 45(1); 1993; 25-30

Eight wheat samples of 4 cv., grown in different regions of New Zealand, were heated at 75-110°C. Starches were isolated from the treated and untreated flour samples. The baking potentials of the starches were estimated from remix baking tests using a starch gluten system. Heat-damage to wheats had a significant adverse effect on the baking performance of starches isolated from these wheats. This effect was not as large as the effect on gluten quality. Heat-damage caused no apparent alterations in starch physicochemical parameters as measured by SEM, amylograph pasting, gelatinization ranges, X-ray diffraction, swelling power and solubility, and water hydration capacity. BV

MILLETS

Barley

1705

Vainionpaeae (J), Forssell (P) and Virtanen (T). **High-pressure gelatinization of barley starch at low moisture levels and elevated temperature.** *Starch/Staerke* 45(1); 1993; 19-24

High-pressure gelatinization of barley starch at low water contents and at elevated temp. was performed in a differential scanning calorimeter equipped with a pressure chamber. Microscopic examination of the samples showed complete loss of birefringence and rupture of granular structure in most samples. Results indicated that enthalpy levels much higher than those in high-moisture gelatinization are needed to attain proper gelatinization and plastification of starch at low water contents. AA

1706

Sanchis (V), Sanclemente (A), Usall (J) and Vinas (I). **Incidence of mycotoxigenic *Alternaria alternata* and *Aspergillus flavus* in barley.** *Journal of Food Protection* 56(3); 1993; 246-248

The predominant fungal spp. present in 60 samples of barley collected in Spain were *Alternaria alternata*, *Penicillium* spp. and *Aspergillus flavus*. Of the 176 *Alternaria* isolates examined, 88.6% produced tenuazonic acid, 15.3% produced alternariol and 9% produced alternariol monomethyl ether. Only 6% of the 190 isolates of *Asp. flavus* produced aflatoxin. AA

Corn

1707

Padmanabhan (M) and Bhattacharya (M). **Planar extensional viscosity of corn meal dough.** *Journal of Food Engineering* 18(4); 1993; 389-411

Application of the entrance pressure drop method to evaluate the extensional viscosity of corn meal during extrusion cooking was investigated. An approximate planar extensional flow was generated by forcing the dough from a circular channel barrel into a slit die. The pressure drop along the contraction was calculated to obtain the entrance pressure drop ΔP_{en}. Both Cogswell's and Binding's analyses were applied to estimate the apparent planar extensional viscosity η_{pa} from ΔP_{en}. The magnitude of η_{pa} from Cogswell's analysis was found to be much larger than that predicted by Binding's analysis. In addition, the severe extension-thinning behaviour exhibited by the fluid introduced problems in the calculations of Binding's analysis for some cases. Calculation and interpretation of the Trouton ratios have to be done carefully when extrapolation of the viscosities is required. Moderate to large entrance corrections were obtained, with lower values obtained for the lower moisture contents and temperatures of extrusion. In all cases the entrance correction decreased with increasing flow rate. AA

1708

Padmanabhan (M) and Bhattacharya (M). **Effect of extrusion processing history on the rheology of corn meal.** *Journal of Food Engineering* 18(4); 1993; 335-349

Slit and capillary dies attached in-line to an extruder are a popular configuration for obtaining the flow curves of food doughs during extrusion-cooking. However, it is demonstrated that the use of screw speed, to vary the shear rate through the die can result in erroneous flow curves for single-crew extruders. Furthermore, the use of a sidestream valve to vary the flow rate for a given screw speed is shown to result in flow curves that are different and better behaved. Such a procedure will be helpful in single-crew extruder systems, not only in obtaining the true flow curves of the food dough, but also in rheological measurements with in-line rheometers. Data for hole pressure (a measure of the first normal stress difference) are also presented to demonstrate the validity of using the sidestream valve and the error in using the screw speed to obtain rheological measurements during extrusion of starchy foods. AA

1709

Danilenko (AN), Bogomolov (AA), Yuryev (VP), Dianova (VT) and Bogatyrev (AN). **Effect of the polymerization degree, moisture content, and temperature on kinetics of hydrolysis of corn starch by α-amylase.** *Starch/Staerke* 45(2); 1993; 63-65

Corn starch hydrolysis was strongly dependent on the degree of polymerization of starch and moisture content of the system. Corn starch hydrolysis increased with increasing moisture content (max. 40%) and decreased with polymerization degree. Reaction rates increased with increasing temp. (max. 80°C). For preparation of corn starch hydrolysates, it is recommended that starch granules be subjected to grinding prior to hydrolysis and that the moisture content of raw starch is greater than 30-40%. BV

PULSES

1710

Modgil (R) and Mehta (U). **Effects of different levels of *Callosobruchus chinensis* L. infestation on proximate principles, true protein, methionine and uric acid contents of greengram and redgram.** *Journal of Food Science and Technology (India)* 31(2); 1994; 135-139

Proximate principles, non-protein nitrogen and uric acid contents in greengram (*Vigna radiata*) and redgram (*Cajanus cajan*) increased significantly with level of infestation except for calories, true protein and methionine contents decreased significantly. Since qualitative and quantitative damages to grains are related to the level of infestations consumption of higher level infested grains is not fit due to presence of insect excreta, uric acid and lack of nutritive value. SD

1711

Wiese (KL) and Jackson (ER). **Changes in calculated process times and drained weight based on soaking and blanching of kidney and navy beans.** *Journal of Food Protection* 56(3); 1993; 239-242

Effects of different soaking/blanching treatments on calculated process time (B_b) for commercial sterility of kidney and navy beans were examined. Beans were canned in 300 x 407 and 603 x 700 cans, each can receiving an equal dry wt. equivalent of beans, and B_b was determined. Effects of soaking/blanching treatments on net wt. and drained wt. were also considered. B_b for kidney beans decreased as moisture levels increased. For 2 h soaked kidney beans, compared with beans soaked for

16 h and blanched, B_b was increased in 300 x 407 and 603 x 700 cans by 9 and 46%, respectively. Drained wt. for 0 and 2 h soaked kidney beans were statistically the same, despite a 3.3-fold increase in moisture level after 2 h soaking. Blanching tended to lower B_b and drained wt. of navy beans. AA

Beans

1712

Tsuda (T), Osawa (T), Nakayama (T), Kawakishi (S) and Ohshima (K). **Antioxidant activity of pea bean (*Phaseolus vulgaris* L.) extract.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 909-913

Antioxidative activity (AA) of pea bean extract and its synergistic activity with α-tocopherol were studied and purification of the antioxidant component and partial characterization of the component are described. AA was studied using a linoleic acid system, with activity being determined by the thiocyanate method. It exhibited strong AA. The extract was separated into an n-butanol phase (BP) and a water phase (WP). The WP had higher activity than the BP. In a study including α-tocopherol, the WP enhanced the AA of the tocopherol. Antioxidative fractions of the WP were purified by preparative HPLC. 5 fractions were collected, 1 with strong AA. This fraction contained 0.31 plus/minus 0.01 and 406.1 plus/minus 0.1 mg/g of phenols and sugars, respectively. The fraction had max. UV absorbance at 264.0 nm. Results indicated that the water soluble antioxidative component from pea beans may be a new type of antioxidant. BV

Locust beans

1713

Lopez da-Silva (JA), Goncalves (MP) and Rao (MA). **Viscoelastic behaviour of mixtures of locust bean gum and pectin dispersions.** *Journal of Food Engineering* 18(3); 1993; 211-228

Viscoelastic properties of single-component systems - locust bean gum (LBG), high-methoxyl (HMP) and low-methoxyl (LMP) pectins - and of HMP/LBG and LMP/LBG blends, were studied using dynamic oscillatory and steady-shear methods. Mechanical spectra of HMP/LBG blends showed characteristics intermediate between the individual components. A possible weak antagonistic interaction was found between LMP and LBG, especially in the mixture with similar amount of each single-component solution. Correlation between dynamic and steady-shear viscosities was compared with the empirical rule of Cox and Merz. Departures from the Cox-Merz rule were observed for the HMP dispersions, whereas for the LMP and the LBG dispersions, the Cox-Merz rule prediction was satisfactory. The different behaviour of LMP relative to the HMP dispersions can be attributed to the lesser extent of intermolecular association and higher hydrodynamic vol., due to the higher charge density. AA

Peas

1714

Wiege (B), Lindhauer (MG) and Bergthaller (W). **Semitechnical methods for the isolation of wrinkled pea protein.** *Starch/Staerke* 45(3); 1993; 81-84

Isoelectric precipitation and ultrafiltration were tested as semitechnical methods for the isolation of wrinkled pea protein. By aqueous extraction of wrinkled pea flour followed by centrifugation, approx. 90% of the total protein could be isolated. Using isoelectric precipitation at pH 4.4 and centrifugation by means of a separator, followed by washing and defatting steps, 65% of the protein contained in the flour was isolated from the extracted protein solution. Crude protein content of this fraction proved to be 83% in DM. Ultra- and diafiltration with a plate and frame process unit were used as alternative methods of protein separation. By diafiltration at optimized process conditions, i.e. temp., pressure and degree of concn., crude protein content of 82% DM was achieved in the concentrate. Yield of the native final product was 83%. AA

Pigeon peas

1715

Mandhyan (BL) and Jain (SK). **Optimization of machine conditions for milling of pigeon**

pea. *Journal of Food Engineering* 18(1); 1993; 91-96

The recovery of dehulled whole kernel and split kernel of 2 var. of pigeon pea [*Cajanus cajan*] was studied under various speeds and clearance in an emery roller mill. Second-order regression equations were developed and optimum conditions of clearance and speed were determined. AA

OILSEEDS AND NUTS

Gorgon nut

1716

Jha (SN) and Prasad (S). **Physical and thermal properties of of gorgon nut.** *Journal of Food Process Engineering* 16(3); 1993; 237-245

Gorgon nut (*Euryale ferox*) an aquatic herb with edible starchy kernel, requires thermal and mechanical treatment in order to remove it from the rest of the raw nut. Bulk density, true density, angle of repose, coeff. of friction on metal surfaces, specific heat, thermal diffusivity and conductivity were determined using standard techniques for different sizes of gorgon nuts at moisture contents and temp. ranging from 15 to 60% (dry basis) at 25 to 55°C, respectively. Physical properties varied quadratically with moisture content. Specific heat increased with moisture and temp. but decreased with the size of the nut; thermal diffusivity showed a reverse trend. Thermal conductivity increased with moisture content but did not follow any trend with temp. within the range of the study. Physical and thermal properties data at various moisture contents and temp. were used to develop equations for different sizes of gorgon nuts. BV

Groundnuts

1717

Mahajan (TS), Chavan (AS) and Dongale (JH). **Effect of boron on yield and quality of groundnut (*Arachis hypogaea*) on lateritic soil.** *Indian Journal of Agricultural Sciences* 64(8); 1994; 532-535

Groundnut crop grown in lateritic soil, was treated with boron at 0.5, 1.0 and 1.5 kg/ha as borax and 0.5 kg/ha as boronated superphosphate and 0.5 p.p.m. in 2 foliar sprays. Application as boronated superphosphate gave max. yield 3200 kg/ha, oil 1156 kg/ha and protein 659 kg/ha. KAR

Macadamia nuts

1718

Palipane (KB) and Driscoll (RH). **Moisture sorption characteristics of in-shell macadamia nuts.** *Journal of Food Engineering* 18(1); 1993; 63-76

Adsorption and desorption isotherms of macadamia in-shell nuts [Macadamia integrifolia] at 9 RH levels and 6 temp. ranging from 11 to 97% and 20 to 60°C, respectively, were established using the gravimetric static method. The goodness of fit of the experimental data to 4 sorption models was evaluated. Based on sorption data, the heats of adsorption and desorption as a function of moisture content were determined. The Guggenheim, Anderson and de Boer (GAB) equation with 6 constants where the monolayer moisture content also varied with temp. according to an Arrhenius-type relationship gave the best fit for both adsorption and desorption data. AA

Safflower

1719

Vasishtha (AK), Bajpai (M) and Singh (C). **Variations in the characteristics and oil compositions in different genetic varieties of safflower.** *Journal of the Oil Technologists Association of India* 26(2); 1994; 59-63

Thirty different var. of safflower analysed showed significant variations in oil, protein and glucosinolate content. Lowest oil content (26.1%) was found in var. 10-4-5-7 and the highest (39.6%) in var. 2092-84. Var. CSS-298 had the lowest protein content of 19.8% and var. 6431 had the highest protein content of 25.0%. Thioglycosides ranged between 0.5 and 3.6% in var. 10-4-5-7 and CSSI 9-1 respectively. Iodine value ranged between 138.5 and 148.7 in var. 423 and 505 respectively. GS

Soybeans

1720

Saxena (S), Gurmukh Singh and Mital (BK). **Physical characteristics and composition of certain new varieties of soybeans.** *Journal of Food Science and Technology (India)* 31(2); 1994; 145-147

Six new var. of soybean showed 7.3-8.6% hull, 0.69-0.74 g/cc bulk density, 1.05-1.18 g/cc true density, 94.3-145.6 g 1000 grain wt. and 5.6-7.6 kg hardness in vertical position and 13.0-19.8 kg in horizontal position. Colour of var. ranged from light yellow to golden yellow. The var. contained (%) 34.3-40.7 protein, 16.5-18.3 fat, 4.1-4.6 crude fibre, 4.5-5.3 total ash and 20.0-25.4 carbohydrates (by difference). The other components include (mg/100 g seeds) 247.4-307.7°Ca, 496.1-540.9 P, 10.3-13.4 Fe and 575-720 total phenols, in addition to trypsin inhibitor activity of 21.1-25.2 TUI/mg sample. AA

Soy products

Soy proteins

1721

Singh (N), Singh (D) and Chauhan (GS). **Effect of defatting, coagulants and coagulation pHs on soy protein isolates.** *Journal of Food Science and Technology (India)* 31(2); 1994; 117-121

Defatted soy flours (DSF) obtained from 4 sources (A, B, C, D) were analysed for chemical characteristics and soy protein isolate (SPI) was prepared by using different coagulants and at coagulation pHs. DSF from source B showed highest protein and ash content. DSF from source C received more heat treatment and showed comparatively lower soluble N, urease activity and trypsin inhibitor activity and higher non-enzymatic browning. SPIs made at lower pHs were whitish and softer in consistency than those made at higher pHs. The physico-chemical properties of SPIs from the DSFs varied widely. Among coagulants and coagulation pHs, HCl and pH of 4.5 produced better quality SPIs. SD

1722

Hayashi (N), Hayakawa (I) and Fujio (Y). **Flow behaviour of soy protein isolate melt with low and intermediate moisture levels at an elevated temperature.** *Journal of Food Engineering* 18(1); 1993; 1-11

The flow behaviour of moisturized (20-70% dry basis) soy protein isolate (SPI) melt at 140°C was markedly dependent on its moisture content. By regression analysis, the Herschel-Bulkley power-law model was successfully fitted to the measured data over the range gamma = 10^3 to 5×10^4 s^{-1}. The discontinuity of the regression coeff. observed at 41-54% dry basis moisture range suggested a difference in melt flow mechanism at opposite sides of this moisture range. At the lower moisture content (20-41% dry basis), SPI melt could flow unisotropically, but at higher moisture content (54-70% dry basis), free water could act as a lubricant. AA

Sunflower

1723

Jimenez (L) and Bonilla (JL). **Acid hydrolysis of sunflower residue biomass.** *Process Biochemistry* 28(4); 1993; 243-247

The acid hydrolysis of sunflower stalks was studied as a first step in their utilization as substrates for ethanol production. BV

TUBERS AND VEGETABLES

Cassava

1724

Abraham (TE). **Stabilization of paste viscosity of cassava starch by heat moisture treatment.** *Starch/Staerke* 45(4); 1993; 131-135

Cassava starch (CS) has poor paste stability during prolonged cooking. Starch with a moisture content of 18-24% was subjected to heat treatment (roasting, pressure cooking, oven drying, microwave heating) for 3-16 h to improve paste stability. Optimum heat treatment for CS with 18-21% moisture content was 16 h at 110°C in an air oven. Modified starch granules were intact and had comparatively increased sedimentation vol., oil binding capacity, amylase susceptibility and decreased crystallinity, water binding capacity, solubility and paste translucency. Freeze-thaw stability of modified CS was improved. Pie filling and halwa (Indian sweetmeat) made from modified CS had good sensory properties. BV

Potatoes

1725

Shirsat (SG), Thomas (P) and Nair (PM). **Effect of γ-irradiation and CIPC treatment on processing quality of potatoes.** *Journal of Food Science and Technology (India)* 31(2); 1994; 130-134

Potato cvs (K. Badshah, K. Jyoti, K. Lavkar, Gujarat-S and Talegaon) after inhibition of sprouting by irradiation or chloroisopropyl phenyl carbamate treatment were stored at 20, 15 and 10°C upto 9 months. Processing quality of cvs was not affected at 15 and 20°C upto 6 months but storage at 10°C caused darker chips due to higher levels of reducing sugars. Potatoes stored for more than 6 months at 15°C, and reconditioning at 27-32°C or blanching improved the colour of the products cvs 'K. Jyoti', 'K. Lavkar', 'Gujarat-S'. K. Badshah with initial reducing sugar levels 310-440 mg/100 g (other cvs 120-240 mg/100 g) was not suitable for processing. *In vitro* infiltration study showed that browning was more due to glucose than fructose or sucrose. SD

1726

Wang (N) and Brennan (JG). **The influence of moisture content and temperature on the specific heat of potato measured by differential scanning calorimetry.** *Journal of Food Engineering* 19(3); 1993; 303-310

DSC was used to determine the specific heat of potato [Desiree]. Effects of temp. and moisture content on specific heat were investigated. Specific heat increased quadratically with moisture content over the range 0-4.13 (g water/g solid) and linearly with temp. varying from 40 to 70°C. A model was proposed to describe the effects of moisture content and temp. on the specific heat of potato. Good agreement was found between specific heat values determined experimentally and predicted by the model. AA

1727

Chen (DSD), Singh (RK), Haghighi (K) and Nelson (PE). **Finite element analysis of temperature distribution in microwaved cylindrical potato tissue.** *Journal of Food Engineering* 18(4); 1993; 351-368

A new finite element formulation for the analysis of temp. distribution in a microwaved potato cylinder was developed by deriving and incorporating a non-linear heat generation term for an axisymmetric and transient heat transfer problem. Using the dielectric properties of potato, temp. distribution was predicted well for centre temp. less than 80°C. The deviation between the predicted and experimental temp. greater than 80°C was corrected using the dielectric properties of water. Pronounced heating was found along the longitudinal axis passing through the centre point of the potato cylinder. AA

1728

Gorinstein (S). **Kinetic studies during enzyme hydrolysis of potato and cassava starches.** *Starch/Staerke* 45(3); 1993; 91-95

Hydrolysis of raw potato (PS) and cassava starches (CS) by bacterial α-amylase depends on action time, temp. and on the specific starch involved. The mol. wt. of commercial α-amylase (Termamyl 60L), as determined by SDS-PAGE, was 55-65 kDa; properties of α-amylase, e.g. kinetic parameters, inhibition, stability and thermostability, were studied during hydrolysis of PS and CS. K_m and V_{max} for α-amylase were fitted to Michaelis-Menten models. Initial substrate vol. at concn. 1% (w/w), temp. and reaction time were varied between 1-3 ml, 37-90°C and 5-80 min, respectively. Optimum liquified starch yields were obtained after 80 min at 80-90°C, pH 5.0-5.2. CS was more readily hydrolysed than PS at all substrate concn. CS had a much lower K_m value (2.25×10^{-3}) than potato starch.

Activation energies were 32.75 and 28.65 kJ/mol for PS and CS, respectively. BV

1729

Ollett (AL), Kirby (AR), Clark (SA), Parker (R) and Smith (AC). **The effect of water content on the compaction behaviour of potato starch.** *Starch/Staerke* 45(2); 1993; 51-55

A comparative study of treatments of the compaction and stress transmission data obtained for potato starch at different water contents in the range 5-25% (wet wt. basis) compacted in a cylindrical geometry is reported. An increase in water content leads to a greater density for a given pressure, approaching zero porosity at higher water contents. The limiting gradient of the Heckel plot, which is the reciprocal of a generalized deformation stress, decreased with increasing water content due to a plasticization mechanism. EM of granules taken from the compacts revealed greater plastic deformation at the higher water contents; the ratio of transmitted to applied stresses showed irregular variation with water content and degree of compaction. At higher water contents (> 17%), the stress ratio was, however, relatively independent of compacted height as predicted by classical semiparticulate analysis. BV

1730

Oezilgen (M). **Enthalpy - entropy and frequency factor - activation energy compensation relations for diffusion in starch and potato tissue.** *Starch/Staerke* 45(2); 1993; 48-51

Diffusion of water in hydrated starch, hydrated starch + sucrose, and diffusion of glucose, K, Mg and ascorbic acid (AA) in potato tissue (PT), i.e. a major natural source of starch, were analysed with Eyring's diffusion theory and the compensation relations. Results implied that there may be an isokinetic temp. (IT) for the diffusion of water in amioca (amylopectin, one of the major macromolecular components of starch) and hylon 7 (native corn starch). Having an IT may imply that diffusional jump occurs via formation of similar activated complexes. Although the compensation relations were satisfied, there was no IT with diffusion of water in hylon 7 + sucrose and diffusion of glucose, K, Mg and AA in PT. Therefore, the compensation relations with these 2 systems were considered only as empirical correlations for estimating diffusivities. BV

1731

Klingspohn (U), Papsupuleti (PV) and Schuegerl (K). **Production of enzymes from potato pulp using batch operation of a bioreactor.** *Journal of Chemical Technology and Biotechnology* 58(1); 1993; 19-25

Trichoderma reesei MCG77 and Rut C30 were grown on several potato pulp substrates in a stirred-tank, batch bioreactor for the production of glycosidases. Substrates used were: potato pulp (PP) consisting of starch, pectin, cellulose and hemicellulose; potato pulp residue (PR) consisting of cellulose and hemicellulose; and enzymic residue (ER) consisting of hydrolysed PR supplemented with potato pulp liquor (PPL). Avicelase, carboxymethylcellulase, xylanase and filter paper cellulase activities of the fungal fermentations were measured. Rut C30 enzyme productivities were > MCG77. Enzyme activities and productivities obtained with PR substrate were comparable to those achieved by other workers using pure cellulose substrates supplemented with a synthetic nutrient solution. Utilization of ER was 85% (w/w). An optimal operation strategy was devised to maximize enzyme production and activity. BV

Sweet potatoes

1732

Madhusudhan (B), Susheelamma (NS) and Tharanathan (RN). **Studies on sweet potatoes. II. Isolation and characterization of starch.** *Starch/Staerke* 45(1); 1993; 8-12

By differential sedimentation and centrifugation steps, 4 starch isolates were recovered from sun dried sweet potato flour and analysed. The granules in these isolates were of different size, shape and population characteristics, and were anionic in nature. They showed a single stage swelling with 30-35% solubility in water and approx. 30% solubility in DMSO after 72 h. Their starch content varied from approx. 48 to 88%. The presence of thermostable amylases in sweet potato resulted in considerable decreases in Brabender viscosity values; amylographic studies in the presence of $HgCl_2$ showed significant increases in peak (PV) and setback (SBV) viscosities. Starch isolate I had 25% higher PV as compared to isolate II, but retrogradation was much lower in the latter. Susceptibility to glucoamylase digestion showed a decreasing trend from isolate I to IV on a solid basis, but was comparable on a starch basis. AA

Vegetables

1733

Sundararajan (R), Tamilselvan (C) and Raghunathan (R). **Residues of herbicide oxyflourfen in cabbage (*Brassica oleracea* convar capitata var. capitata), potato (*Solanum tuberosum*) and groundnut (*Arachis hypogaea*).** *Indian Journal of Agricultural Sciences* 63(1); 1993; 56-58

Three days after sowing of cabbage, groundnut and planting of potato, oxyflourfen was sprayed at 0.1, 0.2 and 0.4 kg ai/ha. 3 months after application, cabbage heads did not contain the residues, while potato tubers had highest % of residues and only traces of residues in groundnut kernels. KAR

1734

Sharma (DC) and Mahabir Singh. **Residual toxicity of insecticides on cabbage caterpillar (*Pieris brassicae*) and their dissipation on cauliflower (*Brassica oleracea* convar *botrytis* var *botrytis*.** *Indian Journal of Agricultural Sciences* 63(1); 1993; 59-63

To control the cabbage caterpillar (*P. brassicae*) cauliflower (*B. oleracea*) was sprayed in the winter season of 1988-89 wih cypermethrin (0.1125 kg ai/ha), decamethrin (0.06 kg ai/ha, fenvalerte (0.075 kg ai/ha), permethrin (0.0375 kg ai/ha), dichlorvos (0.375 kg ai/ha), endosulfan (0.525 kg ai/hja), malathion (0.375 kg ai/ha), and moanocrotophos' (0.30 kg ai/ha). Residual toxicity and dissipation were noted after the second spray. Toxicity of insecticides within 24 h of spray was in the order: decamethrin > dichlorvos > endosulfan > permethrin > cypermethrin > fenvalerate > monocrotophos > malathion. After the spray dichlorvos killed second instar larvae within 5 days; decamethrin, permethrin, fenvalerate, cypermethrin, malathion within 7 days; endosulfan within 10 days and monocrotophos within 15 days. Av. number of days required for the insecticides after spray to reach below FAO/WHO prescribed tolerance limit was 7.26, 6.55, 7.4, 6.4, 5.33, 6.35, 12.29 and 11.59 for cypermethrin, decamethrin, fenvalerate, permethrin, dichlorvos, malathion, monocrotophos and endosulfan respectively. KAR

1735

Hao (YY) and Brackett (RE). **Influence of modified atmosphere on growth of vegetable spoilage bacteria in media.** *Journal of Food Protection* 56 (3); 1993; 223-228

Six gas mixtures ($CO_2/O_2/N_2$: O/5/95, 0/10/90, 5/10/85, 5/20/75, 10/5/85 and 10/20/70) and air were used to investigate effects of modified atmosphere (MA) on growth of 4 vegetable spoilage bacteria [*Erwinia carotovora* subsp. *carotovora* ATCC 15713, *Xanthomonas campestris* pv. *vesicatoria* ATCC-1 11551, *Pseudomonas fluorescens* 78/34 and Pepper No.15 (a pectinolytic *Pseudomonas*]). Ability of the MA to reduce spoilage in bell peppers inoculated with the respective bacteria was also studied. Growth of *Erwinia*, *Pseudomonas*, *Xanthomonas* and Pepper No.15 at 10 and 20°C was not significantly affected by the gas mixtures. At 5°C, growth of *Erwinia*, *Xanthomonas* and Pepper No.15 was slightly reduced by some gas mixtures ($CO_2/O_2/N_2$: 0/5/95, 0/10/90 and 10/5/85; 10/5/85; 0/5/95 and 10/5/85, respectively). MA containing $CO_2/O_2/N_2$: 10/5/85 did not the reduce ability of bacteria to grow at elevated NaCl concn. This MA composition did not change the % of inoculated bell peppers spoiled, but enhanced the overall visual quality. CSA

1736

Golden (DA), Rhodehamel (EJ) and Kautter (DA). **Growth of *Salmonella* spp. in cantaloupe, watermelon, and honeydew melons.** *Journal of Food Protection* 56 (3); 1993; 194-196

Ability of *Salmonella* spp. to grow on interior tissues of cantaloupe, watermelon and honeydew melons was investigated. Pieces of rind-free melon (pH 5.90-6.67) and tryptic soy broth (TSB, pH 5.90) were inoculated with a mixed culture (approx. 100 cfu/g or ml) containing equal proportions of 5 *Salmonella* spp. (*S. anatum, S. chester, S. havana, S. poona* and *S. senftenberg*). Inoculated melon pieces and TSB were incubated for 24 h at 5 or 23°C. Viable populations of salmonellae were determined by surface plating test portions on Hektoen enteric agar. Results indicated that *Salmonella* growth was rapid and prolific on melons and in TSB at 23°C. Final populations on watermelons were approx. 1.0 $\log_{10}$ > populations on cantaloupe and honeydew melons and in TSB. Although viable *Salmonella* populations on melons and in TSB did not increase during the 24 h incubation at 5°C, little or no decrease in viable populations was observed. AA

1737

Benkerroum (N), Misbah (M), Sandine (WE) and Tantaoui (E-A). **Development and use of a selective medium for isolation of Leuconostoc spp. from vegetables and dairy products.** *Applied and Environmental Microbiology* 59(2); 1993; 607-609

A selective medium (LUSM medium) for isolation of *Leuconostoc* spp. was developed. The medium contained 1.0% glucose, 1.0% Bacto Peptone (Difco), 0.5% yeast extract (BBL), 0.5% meat extract (Difco), 0.25% gelatin (Difco), 0.5% calcium lactate, 0.05% sorbic acid, 75 p.p.m. of sodium azide (Sigma), 0.25% sodium acetate, 0.1% (v/v) Tween 80, 15% tomato juice, 30 μg of vancomycin (sigma) per ml, 0.20 μg of tetracycline (Serva) per ml, 0.5 mg of cysteine hydrochloride per ml and 1.5% agar (Difco). LUSM medium was used successfully for isolation and enumeration of *Leuconostoc* spp. in dairy products and vegetables. Of 116 colony isolates obtained from fresh raw milk, curdled milk, or various vegetables, 115 were identified as members of the genus *Leuconostoc*. A total of 89 of these isolates were identified to spp.; 13.5% of isolates were *L. cremoris*, 7.9% were *L. mesenteroides* subsp. *mesenteroides*, 11.2% were *L. mesenteroides* subsp. *dextranicum*, 16.9% were *L. mesenteroides* subsp. *paramesenteroides*, 10.1% were *L. lactis*, and 40.4% were *L. oenos*. When counts obtained for 2 strains, *L. dextranicum* 181 and *L. cremoris* JLL8, on MRS agar and LUSM medium were compared, no significant differences were found between values obtained on the 2 media. AA

Tomatoes

1738

Doreyappa Gowda (IN), Ramanjaneya (KH), Anand (N), Sadashiva (AT) and Tikoo (SK). **Studies on the physico-chemical characteristics and processing quality of two IIHR tomato varieties in relation to commercial cultivars.** *Journal of Food Science and Technology (India)* 31(2); 1994; 126-129

'Arka Ashish' and 'Arka Ahuti' tomato var. were compared with 6 commercial var. They showed better fruit wt. than 'Pusa Ruby', 'Punjab Chhuhara' and 'Lerica', greater firmness than all other var. except 'Lerica', better total soluble solids than 'Pusa Ruby' and 'Roma' and better viscosity than 'Pusa Ruby', 'Roma' and 'Pusa Gaurav'. 'Arka Ashish' showed max. juice yield and lycopene content. In acidity and ascorbic acid they were comparable to other var. Puree from these 2 new var. possessed significantly higher lycopene, better viscosity and sensory quality than others. 'Lerica' and 'Pusa Gaurav' were next best var. SD

FRUITS

1739

Nwanekezi (EC), Alawuba (OCG) and Mkpolulu (CCM). **Characterization of pectic substances from selected tropical fruits.** *Journal of Food Science and Technology (India)* 31(2); 1994; 159-161

Pectin content of orange, lime, banana, mango, native mango, garden egg, avocado pear, pawpaw, cashew apple, star apple, tomato and guava fruits was studied. Mango had the highest pectin content of 1.8%, while tomato contained the lowest pectin (0.53%). The anhydrogalacturonic acid was the highest in mango, while it was the lowest in star apple.

Solubility and viscosity of the pectin were found to increase with increasing methoxyl ester content. Jams of good gelation characteristics and acceptability were produced from some of these fruits. AA

1740

Gergova (K), Petrov (N), Butuzova (L), Minkova (V) and Isaeva (L). **Evolution of the active surface of carbons produced from various raw materials by steam pyrolysis/activation.** *Journal of Chemical Technology and Biotechnology* 58(4); 1993; 321-330

A 1 step pyrolysis/steam activation was used to produce activated carbons from apricot stones, nuts, coconuts, almond shells and grape seeds, and Bulgarian lignite. Evolution of the active surface of the carbons was investigated. Results indicate that the adsorption properties of activated carbons were dependent on treatment temp., soak time and the raw materials. BV

Apples

1741

Mahajan (BVC). **Biochemical and enzymatic changes in apple during cold storage.** *Journal of Food Science and Technology (India)* 31(2); 1994; 142-144

Biochemical and enzymatic changes in apple during cold storage were studied. Total soluble solids, total sugars and soluble protein contents increased upto 150 days of storage and thereafter declined. In contrast, titratable acidity, total phenols and pectin contents followed a linear declining trend throughout the storage period of 7 months. The activity of polygalacturonase and cellulase increased upto 150 days of storage, thereby leading to softening of apple. The activities of these enzymes declined thereafter. AA

Grapes

1742

Gomez (E), Martinez (A) and Laencina (J). **Influence of SO_2 and yeast development on the evolution of C6 compounds during the first hours of vinification.** *Italian Journal of Food Science* 5(3); 1993; 263-268

The evolution of C6 alcohols and aldehydes was studied during the first hours of vinification of grapes of the cv. Cabernet Sauvignon. Likewise, the effect of various parameters such as SO_2 and yeast action was investigated. Results showed that the main C6 compounds in the must are hexanol and trans-2-hexenol. Yeasts have the greatest effect on the evolution of these compounds. AA

Jujube

1743

Ando (Y) and Takagi (T). **Micro method for stereospecific analysis of triacyl-*sn*-glycerols by chiral-phase high-performance liquid chromatography.** *Journal of the American Oil Chemists' Society* 70(10); 1993; 1047-1049

A procedure for micro stereospecific analysis (SA) of triacyl-*sn*-glycerols (TGs) by HPLC on a chiral column is presented. TGs were partially hydrolysed with ethyl magnesium bromide and total products were immediately converted to 3,5-dinitrophenylurethane derivatives. Each of the 1- and 2-monoacylglycerol (MG) derivatives was isolated by HPLC on a silica column. The 1-MGs were resolved into *sn-1* and *sn-3* MG fractions by HPLC on a Sumichiral OA-4100 column. Fatty acid methyl esters obtained from the *sn-1*, *sn-2* and *sn-3* MG fractions were analysed by GLC on a capillary column. Analyses of standard TGs showed that, even with 1 mg of sample, accuracy was comparable to that obtained with 100-mg samples. The procedure was used for SA of jujube pulp (5 mg) and rmesults confirmed the characteristic occurrence of a (n-5) series of monounsaturated fatty acids associated with jujube pulp. BV

Kiwifruits

1744

Galletti (GC), Mincione (B), Mellon (FA) and Waldron (KW). **Application of pyrolysis/gas chromatography/mass spectrometry to the analysis of kiwi mucilage.** *Italian Journal of Food Science* 5(4); 1993; 379-386

Kiwifruit (*Actinidia chinensis* Planch. var. *hispida* C.F. Liang.) mucilage was subjected to pyrolysis/GC/MS (PY/GC/MS) analysis as a practical example to show the potential of the method in the study of vegetable fibre. Pyrograms are reported for 30 pyrolysis fragments ascribed to lignin, structural polysaccharides and proteins. The behaviour of such macromolecules under PY/GC/MS is described explaining the basic principles of analytical pyrolysis with emphasis on the analysis of vegetable fibre. AA

Lemons

1745

Pifferi (PG), Manenti (I), Morselli (L) and Spagna (G). **Isolation and purification of limonin from lemon seeds.** *Italian Journal of Food Science* 5(3); 1993; 269-276

Pure limonin is needed as a substance for chromatographic reference for the quality control of citrus juices. A method is described for isolating and purifying limonin which can be easily and quickly carried out and which is capable of giving a high yield (approx. 92%). The method entails the use of acetone for continuous extraction of limonin from the dried powder of ground lemon seeds, previously defatted wth petroleum ether (60-80°C b.p.). The raw limonin obtained by diluting the conc. acetone extract with petroleum ether is then purified by reprecipitation with isopropanol from methylene chloride. The purity of limonin during extraction was determined by HPLC and TLC, using a new solvent which permitted a good resolution of the limonoids, the limonoic acids and flavonoids. AA

Mandarin orange

1746

Premi (BR), Lal (BB) and Joshi (VK). **Distribution pattern of bittering principles in kinnow fruit.** *Journal of Food Science and Technology (India)* 31(2); 1994; 140-141

Analysis of different parts of kinnow fruit showed naringin content of 0.422 mg/g in peel, 0.230 mg/ml in juice, 0.134 mg/g in seed, and limonin content of 9.52 mg/g in seed, 4.69 mg/g in peel, 0.218 mg/ml in juice. Juice stored at 25°C developed full bitterness at 4 h than that stored at 12.5°C in 7 h. SD

CONFECTIONERY, STARCH AND SUGAR

1747

Morris (VJ). **Fermentation-derived polysaccharides for use in foods.** *Journal of Chemical Technology and Biotechnology* 58(2); 1993; 199-201

Development of xanthan and gellan gums and their use in the food industry are described. Potential new bacterial polysaccharides of interest to the food industry include cyclosophorans (cyclic β(12)D glucans), acetan (a xanthan-like polymer from *Acetobacter*) and exopolysaccharides from lactic acid bacteria. BV

Starch

1748

Karathanos (VT) and Saravacos (GD). **Porosity and pore size distribution of starch materials.** *Journal of Food Engineering* 18(3); 1993; 259-280

Bulk porosity and pore size distribution were measured for granular heat-gelatinized and extruded starch materials, using helium stereopycnometry and mercury porosimetry. Most of the pores of granular materials had a radius of 1-3 μm and bulk porosity about 0.6. About 20% of the total porosity is due to the 6-8 μm voids between starch agglomerates, about 60% is due to the voids around starch granules (1-3.5 μm) and 10% is due to the very small pores. The remaining 10% of the total porosity might be due to pores larger than 150 μm. Gelatinized starches had average pore sizes of 0.8-1.5 μm and bulk porosity < 0.1. Extruded starches had pores varying from 1 to 120 μm and bulk porosity 0.1-0.95, depending on the experimental extrusion conditions. High porosity and large pores resulted when starch was extruded at high temp. and/or low moisture contents. Mechanical compression reduced bulk porosity and size of the pores.

Porosity and mean pore size of starches increased during the drying process. Porosity and pore size distribution are important parameters in the transport (diffusion) of water in starch materials and starch-based foods. AA

1749

Valle (G-D), Barres (C), Plewa (J), Tayeb (J) and Vergnes (B). **Computer simulation of starchy products' transformation by twin-screw extrusion.** *Journal of Food Engineering* 19(1); 1993; 1-31

A computer program based on a comprehensive model of co-rotating twin-screw extrusion was developed. Apart from the specific study of each section of the extruder, it allows a wide range of simulations of the complete process for starchy products. Mixing performances of kneading elements were computed. Axial profiles of filling ratio, temp., pressure and specific shear energy (computed specific energy - CSE) were predicted, and good agreement was found with experimental results and other theoretical studies where available. The program was validated for many different extrusion conditions on the basis of the comparison between computed and measured pressure and apparent viscosity at the die, specific mechanical energy and CSE. The value of CSE in predicting the transformation of starchy products is emphasized, and an example of the use of computer simulation for process scale-up is given. AA

1750

Shah (DN), Chattoo (BB), Kothari (RM) and Hegde (MV). **Starch hydrolysate, an optimal and economical source of carbon for the secretion of citric acid by *Yarrowia lipolytica* (DS-1).** *Starch/Staerke* 45(3); 1993; 104-109

Secretion of citric acid (CA) by *Yarrowia lipolytica* (DS-1) was studied as a function of carbon source, e.g. glucose, fructose, hydrol, sucrose, cane sugar molasses (CSM), kerosene (all available commercially) and tapioca starch hydrolysate (TSH), invert sucrose and invert cane sugar molasses (all prepared in the laboratory). On the basis of their acceptability by DS-1 for CA and isocitric acid secretion, it is concluded that: sucrose and CSM (with/without inversion) served as poor carbon sources; fructose, hydrol, impure TSH (96 DE w/w) and invert sucrose served as relatively better carbon sources; and purified TSH (96 DE w/w) was the best carbon source to substitute glucose by giving comparable (75%) efficiency of conversion and economical advantage. BV

1751

Soni (PL), Harshwardhan (S) and Gharia (MM). **Physicochemical properties of *Quercus leucotrichophora* (oak) starch.** *Starch/Staerke* 45(4); 1993; 127-130

Quercus leucotrichophora (oak) is an evergreen tree found in Kashmir and western Himalayan regions, India. Starch from the seeds of Q. leucotrichophora was isolated, purified and its physicochemical properties determined. SEM of granules showed that they are oval to eliptical in shape. Starch had high contents of ash (1.41%), lipids (2.64%), proteins and lower contents of amylose (15.6%) compared to other starches of forestry origin. Gelatinization temp. was 80-85°C. The starch displayed high water binding capacity, low swelling capacity and high solubility. Amylograph studies showed 425 BU paste viscosity and no thinning after heating for 3 h. On cooling, starch retrograded to a paste viscosity of 1200 BU. AA

1752

Biliaderis (CG), Mazza (G) and Przybylski (R). **Composition and physico-chemical properties of starch from cow cockle (*Saponaria vaccaria* L.) seeds.** *Starch/Staerke* 45(4); 1993; 121-127

1753

Slominska (L). **Studies on modification of enzymatic saccharification process.** *Starch/Staerke* 45(3); 1993; 88-90

High DE starch hydrolysates are produced in a sequence of continuous process steps (liquefaction) and discontinuous steps (bath saccharification). Batchwise saccharification requires long conversion times (48-72 h) due to the necessity for large saccharification tank vol. Glucoamylase from *Aspergillus niger* was added to maltodextrins (7.2, 14.2 and 20.8 DE) obtained from potato starch. Saccharification time of starch was evaluated at different temp., pH and Ca ion concn. High DE starch hydolysates were obtained after 3-4 h at 75°C, pH 4.0 with a Ca ion concn. of 50μM. BV

1754

Prokop (A) and Tanner (RD). **Foam fractionation of proteins: potential for separations from dilute starch suspensions.** *Starch/Staerke* 45(4); 1993; 150-154

Discusses the fundamentals of the separation of proteins using foaming. Thermodynamic, hydrodynamic and kinetic considerations of foam separation of protein mixtures are discussed as a guide for operating and design parameters. Ways to apply this methodology to the starch industry, particularly in the area of protein (zein) removal from starch particles, are proposed. BV

1755

Vasudeva Singh, Zakiuddin Ali (S) and Divakar (S). **^{13}C CP/MAS NMR spectroscopy of native and acid modified starches.** *Starch/Staerke* 45(2); 1993; 59-62

^{13}C CP/MAS [cross polarization magnetic angle spinning] NMR spectroscopic studies of some starches from cereals (wheat, maize and finger millet), pulses (green gram, chick pea), tuber (potato) and root (tapioca), and their respective acid (HCl, HNO_3) modifed starches, were carried out. While cereal starches exhibited a triplet signal for their anomeric carbons, pulse, tuber and root starches showed doublets. Line width changes in signals indicated that debranching in the modified starches led to narrowing of C6 signals (more pronounced in the case of potato and tapioca starches) and were consistent with the release of branching strains. Potato starch, both native and modifed, was different from other starches as inferred from the chemical shift values for their anomeric carbons and line shape. The dihedral angle (m'2) calculated from chemical shift values for C1 and conformation of dihedral angel (chi) as predicted from chemical shift of C6 are discussed with respect to structural organization. AA

1756

Aggour (YA). **Chemical modification, cross-linking and characterization of some starch hydrogels.** *Starch/Staerke* 45(2); 1993; 55-59

Modified starch hydrogels were prepared by reaction of starch with acrylamide (AAm) under certain conditions, and cross-linked with N,N'-methylenebisacrylamide (MBAAm). Rheological measurements of different ratio gels showed that increasing either the cross-linker or substrate concn. increased the elasticity of gels. The mol. wt. between 2 entanglement points (Me), was calculated from plateau modulus (Gp') values. Effectiveness of the cross-linker was calculated by comparison between the number of elastically effective points determined rheologically [ne(r)] and that obtained from theoretical values [ne(t)]. Effectiveness had a max. value of 5.76% at the higher substrate concn. of 25% (w/w) gels. Swelling of different gels was studied in pure water and in different salt solutions. Results showed that there was shrinking of gels with increasing salt concn.; however, no collapsing occurred in gels with increasing salt concn. Max. water absorption capacity was 140 g/g for 15/3 gels. AA

1757

Kennedy (JF) and Cabalda (VM). **Evaluation of an enzymic method for starch purity determination.** *Starch/Staerke* 45(2); 1993; 45-47

An enzymic method (AFNOR) for starch purity measurement was evaluated for wheat, potato and maize starches. The AFNOR method uses only a single enzyme regime consisting of amyloglucosidase (EC 3.2.1.3) from *Aspergillus niger*. The method showed incomplete conversion of some starch components (up to 2.5%) to glucose as determined by gel permeation chromatography. Degree of conversion for starches ranged between 98 and 99.6%. Negligible amounts of starch were found in precipitates/residues obtained after starch hydrolysis (< 0.1%). S.d. of the method was less than 1% for all starches studied. Results indicated that the method may not accurately measure the purity of all starches. BV

Sugar

Sugarcane

1758

Rais Ahmad and Abdul Qayyum Khan. **A formula for quick estimation of fibre in sugarcane.** *Indian Sugar* 42(12); 1993; 909-911

There are several direct and indirect methods for estimation of fibre % cane and these methods are cumbersome and time consuming. An easy and efficient formula is developed based on juice extraction % cane for quick estimation of fibre. The empirical formula is as follows: Fibre % cane = $(1-F^1)100/1.6$, where F^1 was the factor for max. available juice per unit cane derived from the equation, $F^1 = 2E-(E^2/0.84)$.E was the juice per unit cane. 0.84 was the constant for max. juice recovered at 0.1 fibre per unit cane. 1.6 represents the quantity of fibre including non-separable juice and brix free water per unit of dry fibre. The formula would be of much practical use to sugarcane researchers and sugar mills. AA

1759

Boramanikar (PK), Patil (SA) and Medhane (NS). **Effect of direct incorporation of sugarcane trash in preseasonal and ratoon crop and its effect on yield and quality of sugarcane.** *Indian Sugar* 42(12); 1993; 913-916

Sugarcane trash was directly incorporated in preseasonal and ratoon crop Co 7219 var. in 1984-86 at Pravarnagar, India and its effect on yield and quality of sugarcane studied. The treatments were along with culture (1 kg/t applied in furrows after 2 months of planting and rattoning) chopped trash at 2, 5, 8 and 10 t/ha (T_1, T_2, T_3, T_4) and unchopped trash (respective rates) (T_5, T_6, T_7, T_8) and control (no trash, no culture) (t_9). With preseasonal sugarcane, the treatments and control were comparable in sprouting % and tillering/plot, max. millable canes/plot. 225.80 was found with T_3, 227.00 with T_8; max. yield 101.00 (t/h) with T_4, 98.22 (t/ha) with T_8 and max. commercial cane sugar (CCS) 8.87 with T_1 and 11.31 (t/ha) with T_8. In ratoon crop, all the treatments and control were comparable in shoot/ha, millable cane/ha, and CCS; max. yield 93.48 was found with T_4 and 89.92 (t/ha) with T_8. SD

Sugars

1760

Ikeda (I) and Klibanov (AM). **Lipase-catalyzed acylation of sugars solubilized in hydrophobic solvents by complexation.** *Biotechnology and Bioengineering* 42(6); 1993; 788-791

Complexing glucose and other mono- and disaccharides with phenylboronic acid increased their solubility in many organic solvents. *Pseudomonas* sp. lipoprotein lipase readily acylated such solubilized sugars in these solvents. No reaction was observed without phenylboronic acid, i.e., when sugars are insoluble in the reaction medium. Solubilized D-glucose was enzymically acylated with vinyl acrylate on a preparative scale, and the resultant 6-O-acryloylglucose was chemically polymerized to yield a sugar-based polyacrylate with a mol. wt. of 14 000 Da. AA

BAKERY PRODUCTS

1761

Menon (CPS). **Importance of quality flours in baked products.** *Indian Miller* 23(5); 1993; 23-26

Typical chemical and rheological characteristics of flours for bakery products (breads and fermented crackers, biscuits and cakes) are tabulated. Their functional properties and importance in determining the quality of different bakery products are discussed. SRA

1762

Tong (CH) and Lund (DB). **Microwave heating of baked dough products with simultaneous heat and moisture transfer.** *Journal of Food Engineering* 19(4); 1993; 319-339

By using the Crank-Nicolson finite-difference method, a computer model (allowing for both variable thermal and moisture-transfer properties) for predicting temp. and moisture contents during microwave heating was developed. The model was applied to microwave heating with both continuous and on-off power and to the cooling stage after microwave heating. A method to estimate the electric-field strength of a microwave oven was outlined and verified experimentally. Bread was chosen as the test material. The model predicted temp. very well during microwave heating and the cooling stage. It also predicted the average moisture content closely to experimental values up to 30 s of heating (within 2% error) with an electric-field strength of 42.5 V/cm. AA

1763

Ofoli (RY), Morgan (RG) and Steffe (JF). **Characterization of the swelling of starch doughs during extrusion.** *Journal of Food Engineering* 18(3); 1993; 297-312

A simple but practical model is presented for assessing the die swell of extruded food doughs for a given process history and in the absence of puffing, as a function of die geometry, shear rate and dough rheology. Since there are no simple yet effective models which account for these different phenomena, a phenomenological approach was adopted by combining parts of several models to achieve the objective of the study. The method offers 2 important advantages to die swell analysis. First, all predictions are made solely on the basis of die geometry, die temp., pressure drop across the die, and dough rheological properties, thereby correlating die swell pressure to key operating conditions. Secondly, it provides a basis for developing die swell criteria that may be useful for incorporation in process control algorithms. AA

Biscuits

1764

Kumar (KR). **Shelf life of coconut biscuit in unit and bulk packages.** *Indian Miller* 24(6); 1994; 23-29

Unit packages containing 100 g of coconut biscuits were stored individually and in bulk of 84 units (bulk packed in HDPE and in bi-axially oriented polypropylene pouches). Moisture sorption studies indicated that moisture content of 5.5% is critical with respect to acceptability of texture. Products in flexible pouches stored at (1) 90% RH, 38°C (2) 25-30% RH, 42-45°C, and (3) 65% RH, 27°C, enhanced shelf-life to 35, 90 and 180 days respectively. SRA

Bread

1765

Zanoni (B), Peri (C) and Pierucci (S). **A study of the bread-baking process. I. A phenomenological model.** *Journal of Food Engineering* 19(4); 1993; 389-398

A phenomenological hypothesis of bread baking was developed. Temp., moisture and vol. were determined during baking of a leavened bread sample. Data showed that variations in temp. and moisture of bread during baking were determined by the formation of an evaporation front at 100°C. The progressive advance of the evaporation front towards the inside of the product results in the formation of 2 separate regions: the crust, where moisture is very low and temp. asymptotically tends to the oven temp.; and the crumb, where moisture is constant and temp. asymptotically tends to 100°C. AA

Chapatis

1766

Anita Rawat, Gurmukh Singh, Mital (BK) and Mittal (SK). **Effect of soy-fortification on quality characteristics of chapatis.** *Journal of Food Science and Technology (India)* 31(2); 1994; 114-116

Soy-fortified (10%) chapatis contained 28.8% higher protein, 19.0% higher available lysine that the whole wheat chapatis and higher amounts of Ca, P and Fe than control. Soy-fortification increased PER from 1.3 to 1.7 and *in vitro* protein digestibility from 71.3 to 73.1%. Wt. of liver, heart and testis of rats fed on soy-fortified chapati were significantly higher than those with control diet. Soy-fortified chapatis retained 13% of the trypsin inhibitor activity and were softer. SD

1767

Gupta (TR). **Thermal conductivity of Indian unleavened flat bread (Chapati) at various stages of baking.** *Journal of Food Process Engineering* 16(3); 1993; 227-235

A steady state technique was used to measure thermal conductivity of whole wheat dough (for production of rolled chapatti) and baked chapatti (round disc prepared mostly from whole wheat flour dough) at various stages of cooking. Based on the experimental data of chapatti at various stages of cooking, a linear equation $K = -0.5677 + 0.01396\ M + 0.005131\ T$ is proposed for conductivity of wheat flour dough and baked chapatti at moisture levels (M): $35 < M < 50\%$ [wet basis] and temp. ranges $35 < T < 60^{o}C$. A separate equation $K = 0.3204 + 0.0091\ M - 0.00805\ T$ predicts thermal conductivity of rolled chapatti and baked chapatti at $T > 60^{o}C$. AA

Pasta

1768

Resmini (P), Pellegrino (L), Pagani (MA) and de Noni (I). **Formation of 2-acetyl-3-D-glucopyranosylfuran (glucosylisomaltol) from nonenzymatic browning in pasta drying.** *Italian Journal of Food Science* 5(4); 1993; 341-353

The presence of 5-hydroxymethyl-2-furaldehyde (HMF) in dried pasta was investigated. Other soluble components produced by the advanced Maillard reaction and related to pasta drying were also determined. On the basis of both experimental data and the conditions known to regulate nonenzymic browning, there was found to be a lack of or trace amounts (less than or equal to 0.1 p.p.m.) of HMF in commercial dried pasta. Another water-soluble furanic compound arising from the advanced Maillard reaction between maltose and free amino acids, glucosylisomaltol (chemically 2-acetyl-3-D-glucopyranosylfuran (AGPF], was identified and quantified in pasta by ion-pair reversed-phase HPLC. Being negligible in spaghetti dried under low or medium temp. conditions, AGPF formation proved to be related both to the severity of thermal processing and the availability of free amino acids, mainly glutamine. A relationship was found between the amount of AGPF and redness that develops in pasta dried under either experimental or industrial conditions. Taking into account the reported characteristics of the AGPF precursor, 1-deoxyhexosulose, the extent of this type of advanced Maillard reaction may explain undesirable sensorial changes which sometimes appear in high-temp. dried pasta. AA

MILK AND DAIRY PRODUCTS

1769

Khanna (RS). **Indian dairying: Introspection and opportunities.** *Indian Dairyman* 46(4); 1994; 152-159

The problems of Indian dairy industry; implementation of milk and milk products orders; co-operatives versus private sector; need for subsidies, development cess; strength, weakness, opportunities and threats of the dairy sector; demand for dairy equipment for the manufacture of ice cream, milk shakes, milk and whey powders and cheeses are discussed. GS

1770

Nirula (L). **Investment opportunities in Indian dairying.** *Indian Dairyman* 46(4); 1994; 180-183

Contends that in an Indian dairy industry, quality consistency and innovation are the key requirements to provide total satisfaction with regard to quality, quantity and price to the consumer. GS

1771

Mahadevan (AP). **Marketing opportunities within the country.** *Indian Dairyman* 46(4); 1994; 186-189

Outlines the factors that govern dairy marketing such as growth in population in numbers and in its purchasing power; technological progress on processing, material science and packaging; increasing consumer awareness; and insistence on the quality by the manufacturer, consumer and the regulating agencies. Milk utilisation pattern in India, procurement and marketing of milk, projection of milk consumption and production capacity of milk powder are also projected. GS

1772

Banerjee (RP). **Indian dairy equipment scenario.** *Indian Dairyman* 46(4); 1994; 190-191

Lists out sophisticated equipments available in the Indian dairy industry such as electronic milk tester, evaporating and drying plant, cream separator, plate heat exchanger, homogeniser (small), small capacity packing machine, instruments and controls, bulk vending units and rail/road milk tankers; and know-how to take responsibility for integrated milk projects. Stresses the need for research in the design and development of new equipments like large capacity homogenisers UHT plant, reverse osmosis, ultrafiltration, aseptic packaging machine, packing machine for cheese, butter and ice cream. GS

1773

Pandit (SD) and Rao (CS). **Emerging dairy equipment scenario - I.** *Indian Dairyman* 46(4); 1994; 192-197

The change in the concept and content that have taken place in the dairy equipment industry which facilitate the collection, transportation, processing, pasteurisation, standardisation, separation, homogenisation, automation, powder manufacture, evaporation, pre-heating system, mechanical vapour recompression, spray drying and packaging of milk are covered. GS

1774

Keshavdas (NJ). **Emerging dairy equipment scenario - II.** *Indian Dairyman* 46(4); 1994; 198-200

The dynamic changes in the dairy equipment industry for clean milk production, process continuity, process automation, larger handling capacities, new innovative dietary products, improved product standards, aspetic processing of milk products and packaging systems, indigenous milk products and thrust in R and D activities are covered. GS

1775

Upadhyaya (RL). **Global dairy equipment scenario.** *Indian Dairyman* 46(4); 1994; 202-203

The impact of de-regulation and global economy on Indian economy and the dairy industry equipment manufacturing sector is described. GS

1776

Phelan (J). **Globalisation of dairy research, education and training.** *Indian Dairyman* 46(4); 1994; 204-208

Outlines the attempts made in India for promoting dairy research, education and training and evaluates its adequacy in the global scenario. GS

1777

Hartel (RW) and Chung (MS). **Contact nucleation of ice in fluid dairy products.** *Journal of Food Engineering* 18(3); 1993; 281-296

For freeze concentration processes involving suspension crystallizers, contact (secondary) nucleation of ice crystals may be an important mechanism of formation of nuclei. The critical subcooling required before stable secondary nuclei form is an important design parameter for such freeze concentration systems. Critical subcooling for secondary nucleation of ice in aqueous sugar solutions and fluid dairy products (whey extract, whey powder, skim milk made from non-fat dried milk and store-purchased skim milk) were determined using 2 experimental techniques. The method of observation (experimental technique), type of solution studied and its concn. were found to affect the critical subcooling temp. Of all the components in these solutions, whey protein was the main factor in determining critical subcooling temp. Critical subcooling increased linearly with whey protein content. AA

1778

Hammack (TS), Satchell (FB), Andrews (WH), Amaguana (RM), June (GA), Sherrod (PS), Koopman (L). **Abbreviated preenrichment period for recovery of *Salmonella* spp. from selected low-moisture dairy foods.** *Journal of Food Protection* 56(3); 1993; 201-204

A 6 h and a 24 h preenrichment procedure were compared for their ability to recover *Salmonella* spp. from selected low moisture dairy products [instant dried nonfat milk, non-instant dried non-fat milk, dried whole milk, lactic casein and rennet casein]. Foods were artificially inoculated several days before analysis and 20 replicate test portions per procedure from each food were examined in each experiment. Samples examined by the 6 h abbreviated procedure were preenriched for 6 h at 35°C in an air incubator or water bath and centrifuged at 4100 x g for 10 min. Pellets were suspended in tetrathionate broth and incubated for 24 h at 35°C. For the 24 h standard procedure, test portions were preenriched for 24 h at 35°C in an air incubator, subcultured to tetrathionate broth and incubated for 24 h at 35°C. Selective enrichment broths from both procedures were streaked onto selective agar plates, and presumptive Salmonella isolates were identified by conventional biochemical and serological tests. Recovery of *Salmonella* spp. from instant dried non-fat milk and dried whole milk was equivalent for both preenrichment procedures. Relative effectiveness of the 2 procedures varied in the recovery of *Salmonella* spp. from non-instant dried non-fat milk, lactic casein and rennet casein. AA

Milk

1779

Mittal (SP). **Competitiveness of Indian milk production.** *Indian Dairyman* 46(4); 1994; 160-162

Milk production in India is done by small un-organised farmers who do not have the knowledge of the cost of production. Hence, modernisation of Indian dairy industry in milk processing, product manufacturing and marketing are recommended. Using low cost feed and labour, Indian dairy industry can improve its efficiency and face the increasing competition in the international market. GS

1780

Gill (RS). **Competitiveness of Indian milk production: Another view.** *Indian Dairyman* 46(4); 1994; 164-167

The competitiveness of Indian milk production is viewed from different angles viz. price, quality, packaging quality and marketing effectiveness. Need to have correct estimates of production of milk and various milk products with their costs and market prices, is emphasised. GS

1781

Mahendra Singh. **Impact of liberalisation on milk producers.** *Indian Dairyman* 46(4); 1994; 168-173

The implications following liberalisation and General Agreement on Tariffs and Trade on Indian dairy industry and its possible favourable impacts are discussed. GS

1782

Bhasin (NR). **Impact of GATT on milk producers.** *Indian Dairyman* 46(4); 1994; 174-178

The positive and negative impacts of General Agreement on Tariffs and Trade on milk producers such as affecting the national economy; business of milk production and economics of other agricultural commodities are discussed. GS

1783

Charan (R) and Prasad (S). **Energy conservation in milk spray-drying plant.** *Journal of Food Engineering* 18(3); 1993; 247-258

A mathematical model for the energy consumption in spray-drying plant was developed. The model was tested using data collected from a commercial milk spray-drying plant producing 1500 kg/h baby food. Operating parameters were optimized using the gradient projection method for a multi-variable non-linear function subject to inequality constraints. Energy consumption of the milk drier was compared using the existing and optimized systems. It was found that there was a saving of 16.8% in the total energy consumption. AA

1784

Pagliarini (E), Solaroli (G) and Peri (C). **Chemical and physical characteristics of mare's milk.** *Italian Journal of Food Science* 5(4); 1993; 323-332

Data on the chemical composition and physical properties of mares' milk are presented. A comparison between these data and those obtained for cows' milk shows that levels of fat and cholesterol in mares' milk are about one third those in cows' milk. The ratio of unsaturated to saturated fatty acids is 1.32 (0.45 for cows' milk), and the ratio of polyunsaturated to monounsaturated fatty acids is 0.83 (0.08 for cows' milk). 50% of the protein fraction consists of whey proteins, and the lysozyme content (11%) is very high. Mares' milk has a very high vitamin C content and a low mineral content. The Ca/P ratio is 1.7, which is very close to the optimal value for calcium assimilability. AA

1785

Macri (A), Brambilla (G), Civitareale (C) and Bocca (A). **Multiresidue method for isolation and determination of eight benzimidazole anthelmintics in cow milk.** *Italian Journal of Food Science* 5(3); 1993; 239-245

Reports a multiresidue method using HPLC with a UV diode array detector to estimate, in routine analyses, the presence of 8 benzimidazole anthelmintics (albendazole, fenbendazole, febantel, mebendazole, oxibendazole, oxfendazole, parbendazole and thiabendazole) in cows' milk. Milk (10 ml), freeze-dried overnight, was alkalized with 10N NaOH and extracted with organic solvents (ethyl acetate-methylene chloride (2:1) and hexane-acetonitrile (1:2)). The extract was dried, redissolved in 100 mul of mobile phase (0.017M phosphoric acid adjusted to pH 3.0 with diethylamine-acetonitrile) and injected onto an RP C18 column. The limit of determination was 10 p.p.b. for the drugs considered, i.e. the Maximum Residue Level fixed by the EEC for some of these drugs (febantel, fenbendazole and oxfendazole) in milk. Recovery rates for the drugs spiked in milk ranged from 63.4 plus/minus 5 to 97.0 plus/minus 3%. AA

1786

Lopez (F-R), Corzo (N), Villamiel (M), Delgado (T), Olano (A), Ramos (M). **Assessment of quality of commercial UHT milks by chromatographic and electrophoretic methods.** *Journal of Food Protection* 56(3); 1993; 263-264, 269

Forty four samples of commercial UHT milk were analysed within 15 days of processing for detn. of lactulose, undenatured whey proteins, furosine and proteolysis of caseins as quality indicators for setting legal standards for commercial-heat processed milk. Some UHT milks, containing suggested levels of lactulose (< 600 mg/l) and β-lactoglobulin (> 20 mg/l), showed high levels of casein degradation. Samples which appeared overprocessed, from their lactulose and β-lactoglobulin contents, also contained large amounts of para-kappa-casein which could indicate a poor microbiological quality of raw milk causing protein degradation prior to UHT processing. CSA

1787

El Marrakchi (A), Hamama (A) and El Othmani (F). **Occurrence of *Listeria monocytogenes* in milk and dairy products produced or imported into Morocco.** *Journal of Food Protection* 56 (3); 1993; 256-259

Examination of 227 samples of milk and dairy products *L. monocytogenes*. showed that raw and pasteurized milk and some traditionally prepared Moroccan dairy products such as fermented milks (lben and raib), fresh cream, traditional fresh cheese (jben) and locally made or imported ripened cheeses (Camembert, Brie, Blue) were contaminated with pathogens. Results of the study also indicated that Lben, raib and jben were all contaminated with *L. monocytogenes*. The only other *Listeria* sp. isolated was *L. innocua*, isolated from jben. *L. monocytogenes* was not detected in pasteurized milk, fresh cream or fresh and ripened (industrially prepared) cheeses. CSA

Milk products

Cheese

Cheddar cheese

1788

Grazier (CL), Simpson (R), Roncagliolo (S), Bodyfelt (FW) and Torres (JA). **Modelling of time-temperature effects on bacteria populations during cooling of Cheddar cheese blocks.** *Journal of Food Process Engineering* 16(3); 1993; 173-190

Differences in cooling rate of Cheddar cheese from pressing (35°C) to ageing temp. (3.5-12°C) have been reported to be responsible for flavour variation within a production lot. During ageing, starter and nonstarter bacteria contribute extensively to flavour quality; excessive growth of nonstarter bacteria leads to undesirable flavour characteristics. Temp. effects on [starter and nonstarter lactic acid] bacteria were quantified using cheese from a local processor [during storage at 5-35°C]. At day 1, starter counts were 8×10^7 cfu/g but as ageing continued, starter counts decreased and nonstarters became dominant. At 35°C, starter counts reached 3×10^6 cfu/g by day 3 and were $< 10^6$ cfu/g by day 5. At 25, 20, 15 and 12°C, starter bacteria were $< 10^6$ cfu/g by day 10, 20, 24 and 40, respectively. Nonstarter counts, initially 10^4 cfu/g, reached approx. 10^8 cfu/g in increasingly shorter times with higher temp. Kinetic analysis of [microbial] growth [during cooling] in cheese and in a liquid medium suggested the possibility of diffusion growth limitations in cheese. Computer simulation for the growth of nonstarters suggests that individual cooling of small blocks (18 kg) would reduce the contribution of nonstarter counts to Cheddar cheese ageing. AA

Mozzarella cheese

1789

Moio (L), Langlois (D), Etievant (PX) and Addeo (F). **Powerful odorants in water buffalo and bovine Mozzarella cheese by use of extract dilution sniffing analysis.** *Italian Journal of Food Science* 5(3); 1993; 227-237

Mozzarella cheese made from either water buffaloes' milk or cows' milk was analysed by extract dilution sniffing analysis using a technique best known as CharmAnalysisRegistered. 24 impact aroma compounds were screened in water buffaloes' milk Mozzarella cheese and 16 in cows' milk Mozzarella cheese. The most active aroma compounds of water buffalo Mozzarella cheese were 1-octen-3-ol (raw mushroom, undergrowth, and/or musk), nonanal (tallowy and/or animal), indole (stable) and an unidentified component characterized by a typical aroma of truffles. These 4 compounds together represent greater than 50% of the total aromatic profile. Ethyl isobutanoate and ethyl 3-methylbutanoate, characterized by a green aroma and that of unripe fruit and fresh cheese and/or cheese factory, respectively, represent the impact aroma compounds in cows' milk Mozzarella cheese. The differences observed between the impact compounds of water buffalo and cows' milk Mozzarella cheeses probably justify the sensory differences between water buffalo and cows' milk Mozzarella cheeses. AA

1790

Moio (L), Dekimpe (J), Etievant (PX) and Addeo (F). **Comparison of the neutral volatile compounds in Mozzarella cheese made from bovine and water buffalo milk.** *Italian Journal of Food Science* 5(3); 1993; 215-225

Volatile compounds in bovine's milk Mozzarella cheese were isolated using vacuum distillation followed by continuous liquid-liquid extraction. The extract was analysed by means of high resolution capillary GC and GC-MS. 80 compounds were identified and 61 quantified. They included alcohols (46%), esters (14%), ketones (6%), aldehydes (8%), nitrogen compounds (11%), sulphur components (0.1%), aromatic hydrocarbons (4%) and lactones (9%). Aroma of the individual components was assessed using a GC equipped with a sniffing port. The main differences between cows' milk and water buffaloes' milk Mozzarella cheeses were in the levels of: esters, which were 10x higher in cows' milk cheese; ketones, which were present in smaller amounts in cows' milk cheese (6 vs. 50% of the total neutral volatile fraction); aldehydes and nitrogen compounds, which were approx. half those of buffaloes' milk cheese in cows' milk cheese; and alcohols and lactones, which were higher in cows' milk cheese. Several esters were detected in cows' milk Mozzarella cheese only. Data confirm previous suggestions that the aroma of a fresh cheese, even in the case of a pasta filata cheese, is partly related to the aroma of the milk used for its manufacture. AA

Ice cream

1791

Bharath Bhushan Reddy (B), Kotilinga Reddy (Y), Ranganadham (M) and Padmanabhan Reddy (V). **Bacteriological quality of ice cream marketed in Tirupati, a pilgrimage town of India.** *Journal of Food Science and Technology (India)* 31(2); 1994; 151-152

Counts of mesophilic aerobes, coliforms, aerobic spore formers and staphylococci in market samples of ice cream varied in relation to the sources and packages. Higher counts of coliforms were prevalent in samples collected from local vendors. Ice cream samples from parlours and hotels showed higher staphylococcal counts. With reference to the packages, ice cream sold in cups had higher counts of coliforms and staphylococci, while aerobic spore formers were on a higher side in ice cream bars. AA

Whey

1792

Meenakshi Rani and Verma (NS). **Effect of soymilk supplementation on the coagulation time, green cheese composition and losses of milk components in whey.** *Journal of Food Science and Technology (India)* 31(2); 1994; 156-158

Results indicated that the cow milk (CM) was higher in total solids (TS), fat, acidity and ash contents, except for proteins, as compared to soy milk (SM) or the blends made therefrom. Addition of SM to CM resulted in an increase in clotting time 274, 381, 559, 738 and 906 sec, respectively of different blends (95:5, 90:10, 85:15, 80:20 and 75:25) of CM and SM yield and titratable acidity of whey decreased with the increase in proportion of soy solids in blend, whereas reverse was true for the TS, protein and ash. The yield of cheese increased with increase in the proportion of soy solids in the blend. The moisture content of cheese made from CM using enzymes was similar, but it increased with the increase in the soy solids in the blends. A slight decrease in protein and fat cheese made from various cow:soy milk blends with the microbial rennet was observed. A slight increase in salt content was found in cheese made with higher soy solids in the blend. Increase in titratable acidity, soluble protein and free fatty acid values of cheese were also observed with increases in proportions of soy solids in the cow:soy milk blends. BV

1793

Belmar (BMT), Gotham (SM), Paterson (WR), Fryer (PJ) and Pritchard (AM). **The effect of Reynolds number and fluid temperature in whey protein fouling.** *Journal of Food Engineering* 19(2); 1993; 119-139

Food fouling is a severe industrial problem. Both the chemistry and fluid mechanics of fouling from milk fluids are complex. Experiments were conducted in a tubular heat exchanger to determine whether fouling from whey protein concentrates is controlled by a bulk or a surface reaction. Results are interpreted in terms of a simple model, in which the amount of deposit is considered to be proportional to the vol. of fluid that is hot enough to produce denatured and aggregated protein. The model fits the data reasonably well and suggests bulk processes are important in whey protein fouling. AA

1794

Koutake (M), Matsuno (I), Nabetani (H), Nakajima (M) and Watanabe (A). **Osmotic pressure model of membrane fouling applied to the ultrafiltration of whey.** *Journal of Food Engineering* 18(4); 1993; 313-334

An osmotic pressure model for membrane fouling was investigated for predicting flux behaviour during ultrafiltration of reconstituted whey solutions, using a membrane of mol. wt. cut-off value of 20 000 Da. Estimations of flux were conducted for 3 solutions: whey protein, whey protein + lactose and reconstituted whey, using physical properties of whey protein and lactose measured or obtained from published papers. Estimated fluxes of whey protein and whey protein + lactose solutions compared closely with measured values. Concerned with concentration polarization, this model made it clear that operating pressures were reduced mainly by the osmotic pressure of lactose rejected by the fouled membrane, not of whey protein. In the range of usual operating pressures (0.1-0.4 MPa), fouling was an important factor of flux decline for ultrafiltration of whey + lactose solution. Thus, a less fouling membrane is preferable. AA

MEAT AND POULTRY

Meat

1795

Knudtson (LM) and Hartman (PA). **Comparison of fluorescent gentamicin-thallous-carbonate and KF streptococcal agars to enumerate enterococci and fecal streptococci in meats.** *Applied and Environmental Microbiology* 59(3); 1993; 936-938

Two selective and differential media were compared for their abilities to enumerate enterococci and faecal streptococci in pork, beef and poultry products. Counts obtained on KF streptococcal (KF) agar were compared with counts obtained on fluorescent gentamicin-thallous-carbonate (fGTC) agar. Reactions of 13 known enterococcal spp. were also observed. All 13 spp. of enterococci as well as *Streptococcus bovis* and *S. equinus* grew equally well on fGTC agar. KF streptococcal medium allowed growth of most spp. of enterococci but not *S. bovis* and *S. equinus*. Quantitative comparisons between the 2 media inoculated with pure cultures of known spp. of enterococci revealed equivalent plate counts following incubation. However, when meat samples were plated, counts on fGTC agar were consistently and significantly higher than counts on KF agar for all sample sources. AA

Beef

1796

Vermeulen (P), Urrestarazu (V), Huertas (S), Baltar (J) and Brum (JJ). **Organoleptic qualities and foot-and-mouth disease virus stability in beef patties processed by broiler/continuous belt oven cooking.** *Journal of Food Protection* 56(3); 1993; 219-222

Commercial processing methods routinely used for cooking ground beef patties in the United States were examined for their virucidal activity against foot-and-mouth disease (FMD) virus. To study virucidal activity of the processes, 10 g of the patty centre were replaced with FMD virus infected lymph node tissue prior to processing. Processing involved passing the patties through a broiler and then oven cooking for 0, 5, 10, 15 or 20 min. Cooking patties for 20 min after broiling, giving them an exit temp. of 99.7°C, inactivated greater than 4.0 log10 pfu of FMD virus. Sensory analysis of products which had been prepared using the virucidal process showed the process yielded consumer-acceptable products. AA

1797

Fernandez (E-E), Saldana (L-J) and Rodriguez (G-O). **Fate of *Salmonella* in salpicon, a Mexican cold shredded beef salad.** *Journal of Food Protection* 56(3); 1993; 197-200

Pork

Pigs

1798

Kotula (AW) and Sharar (AK). **Presence of *Yersinia enterocolitica* serotype O:5,27 in slaughter pigs.** *Journal of Food Protection* 56(3); 1993; 215-218

The tonsils, tongue, mesentric lymph nodes, caecal contents and faeces from 50 slaughter pigs were evaluated for the presence of pathogenic serotypes of *Y. enterocolitica* strains. The caecal contents and faeces of 2 pigs (4%) were positive for serotype O:5,27, biotype 3, whereas all other pigs were negative for pathogenic serotypes of *Y. enterocolitica*. This serotype has been reported to cause yersiniosis in humans. Results suggested that measures should be taken to detect and control the spread of the organism. CSA

Products

1799

Zanoni (B), Peri (C), Pierucci (S) and Barattini (A). **Predictive modelling of Bologna sausage cooking.** *Italian Journal of Food Science* 5(4); 1993; 311-322

A model was developed to describe heat and mass transfer phenomena during cooking of cylindrical Bologna sausages under varying temp. conditions. The model was solved by a finite difference numerical method. Validation experiments demonstrated that the model adequately simulates temp. and absolute moisture profiles at each point of the product and the total mass loss. This model was then applied to predictive bacteriology. The number of microorganisms at each point of the product and at each stage of the process was evaluated by combining the heat and mass transfer model and equations of microbial growth and destruction. The kinetic constants used in the model were taken from literature data on thermoresistant Enterococcus strains. This approach could be considered for future research on process control and optimization. AA

Poultry

1800

Nath (RL), Mahapatra (CM) and Singh (JN). **Avian muscle and its relevance to meat industries.** *Poultry Guide* 31(8); 1994; 25-30

Need for further research on the aspects of electrical stimulation method for improving poultry meat quality; predicting the effects of ingredients and processing variables on cook yield; development of decolourization process for using red meats in white meat products; and control of pH of the comminuted meat to maximize functionality during processing are discussed. GS

1801

Bellomonte (G), Filesi (C), Macri (A), Mosca (M) and Sanzini (E). **High performance liquid chromatographic determination of nitrofurans and free chloramphenicol in poultry muscle, liver and eggs.** *Italian Journal of Food Science* 5(3); 1993; 247-253

Nitrofurans and chloramphenicol are used extensively in the poultry industry and their residues in meat and eggs are a worldwide health concern. An HPLC procedure was developed for the analysis of nitrofurazone, furazolidone, furaltadone and free chloramphenicol residues in poultry meat, liver and eggs. The limit of quantitation (LOQ) of this method was 2 p.p.b., except for chloramphenicol in liver for which the limit of quantitation was 10 p.p.b. Recoveries from fortified samples ranged from 88 to 95%. The assay required small amounts of sample and reagents, it was sensitive, had high recoveries, and can be used to determine residues from both nitrofurans and chloramphenicol in a variety of matrices. AA

Chickens

Broilers

1802

Samanta (M) and Biswas (P). **The use of lactic acid in broiler production.** *Poultry Guide* 31(8); 1994; 53-54

Probiotics is the new addition as growth promoter in poultry production. At 0.25% level they produce lactic acid, lowering internal pH and beneficial effects in broilers such as wt. gain, better feed conversion, reduced mortality and higher carcass yield. GS

1803

Macri (A), Valfre (F), Pieramati (C), Pierdominici (E), Achene (L), Ioppolo (A). **Effect of clenbuterol on broiler chickens under intake restriction.** *Italian Journal of Food Science* 5(3); 1993; 255-262

Experiment was conducted on broiler chickens to establish whether the repartitioning effect of the β-agonist clenbuterol (0.5, 1 and 2 p.p.m.) is present in severe intake restriction conditions (about 50% of [the National Research Council] NRC estimated daily intake). Clenbuterol had a positive effect on body wt. gain; the repartitioning effect was also present.

Carcass wt. increased more than live wt., and superficial pectoral muscle wt. increased more than carcass wt. Carcass fat decreased up to 2.8% and carcass protein increased up to 4.1%, both on DM basis. AA

Products

Eggs

1804

Marolia (KZ) and D'Souza (SF). **Removal of glucose from hen egg using glucose oxidase and catalase co-immobilized in hen egg white foam matrix.** *Journal of Food Science and Technology (India)* 31(2); 1994; 153-155

A novel technique has been developed for obtaining a porous hen egg white foam matrix containing co-immobilized glucose oxidase and catalase. The technique involved cross-linking of the foamed egg white along with the enzymes using 0.75% glutaraldehyde for 1 h. The foamed matrix was mechanically very stable and could be reused in 10 batches for the removal of glucose from eggs, without loss in activity. AA

SEAFOODS

1805

Cormier (A), Chiasson (S) and Leger (A). **Comparison of maceration and enumeration procedures for aerobic count in selected seafoods by standard method, PetrifilmRegistered, RedigelRegistered, and Isogrid.** *Journal of Food Protection* 56(3); 1993; 249-251, 255

Two methods of macerating samples, manual shaking and homogenizing in a Waring blender, were compared for 12 replicates of raw clams, raw cod, cooked lobster and cooked shrimp. 3 commercial aerobic count detn. methods, Isogrid, Redigel^{TM} and Petrifilm^{TM}, were compared with the standard aerobic plate count method for raw cod, raw mussels and frozen cooked shrimp. Counts obtained for maceration by manual shaking were highly correlated (r = 0.98) with those obtained after maceration by the blender homogenization method. Compared with conventional blender homogenization, the manual shaking technique gave recoveries of 98.2% for clams, 99.7% for cod, 101.6% for lobster and 97.2% for shrimp. No significant differences were found between the 4 enumeration methods. Correlation coeff. obtained by plotting $\log_{10}$ cfu/g for 1 enumeration method against a 2nd method ranged from 0.86 to 0.99. Counts obtained with the 3 commercial methods were from 97.6 to 104.0% of the counts obtained by the standard method. The Isogrid, Redigel^{TM} and Petrifilm^{TM} methods are suitable alternatives to the conventional standard plate count method for aerobic counts detn. in sea foods. AA

Mussels

1806

Soto (M), Mendez (R) and Lema (JM). **Sodium inhibition and sulphate reduction in the anaerobic treatment of mussel processing wastewaters.** *Journal of Chemical Technology and Biotechnology* 58(1); 1993; 1-7

Oyster

1807

Jawahar Abraham (T), Balasundari (S), Indra Jasmine (G) and Jeyachandran (P). **Influence of antioxidants on the sensory quality and oxidative rancidity of frozen edible oyster.** *Journal of Food Science and Technology (India)* 31(2); 1994; 168-170

Sensory acceptability and oxidative rancidity of antioxidant-treated edible oyster, frozen at -40°C and held under frozen storage (-18°C) condition, were investigated. The sensory acceptability declined steadily during storage and was accompanied by an increase in the oxidative rancidity of the product. Untreated and butylated hydroxy toluene (0.2% w/w) treated samples developed dark discolouration after 2 months of storage. Addition of clove powder (0.20% w/w) significantly reduced the oxidative rancidity, measured as thiobarbituric acid reactive substances, and improved the sensory acceptability of the product. AA

1808

Atmar (RL), Metcalf (TG), Neill (FH) and Estes (MK). **Detection of enteric viruses in oysters by using the polymerase chain reaction.** *Applied and Environmental Microbiology* 59(2); 1993; 631-635

A procedure for detection of enteric viral nucleic acid in oysters by PCR was developed. Known quantities of poliovirus type 1 were seeded into oysters. Virus was extracted and concentrated by using organic flocculation and polyethylene glycol precipitation. Inhibitors of reverse transcription-PCR were present in oyster extracts, preventing amplification of target viral nucleic acid. Cetyltrimethylammonium bromide precipitation removed inhibitors sufficiently to allow detection of as few as 10 pfu of poliovirus. Norwalk virus could also be detected after being seeded into oysters. This methodology may be useful for the detection of these and other shellfish-borne viral pathogens. AA

Prawns

1809

Jawahar Abraham (T) and Jeyachandran (P). **Studies in microorganisms associated with prawn pickle.** *Journal of Food Science and Technology (India)* 31(2); 1994; 165-167

Microorganisms associated with prawn pickle, stored at ambient temp. (30 plus or minus 2°C) were studied for 270 days at regular intervals. A decrease in total viable count up to 60 days and a slight increase thereafter were observed. *Bacillus* spp. were the dominant group comprising more than 50% of the total population, followed by *Micrococcus* spp. The population of anaerobic spore-formers increased with the increase in storage period. All the bacterial isolates were positive for lipid hydrolysis, while only *Bacillus* spp. were able to liquefy gelatin. The initial bacterial flora were sensitive to low pH and higher salt levels, in contrast to higher salt and acid tolerance by the surviving bacterial flora during storage. AA

Shrimps

1810

Thomas (F) and Iyer (TSG). **Indole an index of decomposition in shrimp.** *Seafood Export Journal* 25(18); 1994; 23, 27

Levels of indole are used as indicators of decomposition in the seizure of frozen sealed shrimp. Indole content in the frozen shrimps exported from India are within permissible limits, viz., 25 μ/100 g as fixed by importing countries. GS

Fish

1811

Bhaskaran Nair (P). **ISO 9000 quality system for fish- and fishery products - an introduction to basic concepts.** *Seafood Export Journal* 25(17); 1994; 35, 37, 39, 41, 43

Basic concepts and structure of ISO 9000 quality system standards for fish and fishery products are described. Cross reference list of quality system elements comparing ISO 9001, 9002, 9003 and 9004 is also provided. GS

1812

Bhattacharya (S), Das (H) and Bose (AN). **Effect of extrusion process variables on the product texture of blends of minced fish and wheat flour.** *Journal of Food Engineering* 19(3); 1993; 215-235

Effects of extrusion process variables (such as length/ diam. (L/D) ratio of extruder, feed ratio (ratio of fish solids and wheat flour), temp. of extrusion and screw speed) on product texture, obtained by extrusion of blends of partially dried low-cost minced fish (Bombay duck, Harpodon nehereus) and wheat flour were studied. A single-screw variable-length cooling extruder, with a barrel bore of 25 mm, was developed for this purpose. Heat stability of cooked extruded rods in boiling water was assessed. The texture parameters (hardness, springiness and cohesiveness) of cooked rods were determined and compared with those of cooked fish, with the objective of developing a fish analogue using extrusion cooking. Among the process variables, an increase in L/D ratio or feed ratio increased texture parameters; effects of extrusion temp. and screw speed on texture parameters were complex in nature. AA

Tuna

1813

Banga (JR), Alonso (AA), Gallardo (JM) and Perez (M-RI). **Mathematical modelling and simulation of the thermal processing of anisotropic and non-homogeneous conduction-heated canned foods: application to canned tuna.** *Journal of Food Engineering* 18(4); 1993; 369-387

Thermal processing of conduction-heated canned foods was modelled using 3 approaches: homogeneous isotropic; homogeneous anisotropic; and non-homogeneous anisotropic systems. Based on these models, numerical simulations were performed, using finite differences and finite elements methods. Simulation results were validated with experimental data obtained from the sterilization of canned tuna, a rather complex system. The last approach was found to be the most appropriate though the 2nd can be used for practical purposes. AA

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

1814

Boboye (BE) and Adetuyi (FC). **Fungal population associated with raw materials and intermediate products of lager beer produced from Nigerian sorghum grains.** *Journal of Food Science and Technology (India)* 31(2); 1994; 148-150

Fungi were enumerated on potato dextrose agar, malt extract agar, Czapek Dox and wort agar during the processing of sorghum for the production of lager beer. Isolates were purified and characterized. *Aspergillus* sp., *Rhizopus* sp., *Mucor* sp. and *Alternaria* sp dominated the populations on malt extract agar, while *Penicillium* sp, *Curvularia* sp. *Dreschlera* sp. and *Neurospora* sp formed the rest of the populations. AA

Wines

1815

Zamorani (A), Spettoli (P), Lante (A), Crapisi (A) and Pasini (G). **Immobilized laccase and tyrosinase: an approach for wine stabilization.** *Italian Journal of Food Science* 5(4); 1993; 409-414

Laccase [from *Pyricularia oryzae* and *Botrytis cinerea*] and tyrosinase [from mushroom] were immobilized by physical and chemical methods on inorganic and organic carriers [as part of a study investigating wine stabilization. Oxidative properties of immobilized enzymes in comparison with free enzymes on phenolics were also tested in model solutions of wines and musts.]. Laccase, adsorbed on molecular sieves and silica gel, and tyrosinase, immobilized both by adsorption and by covalent coupling, gave immobilization yields greater than 90%, whereas the best activity yields ranged from 22 to 38%. Laccase and tyrosinase immobilized on silica gel plus glutaraldehyde caused a decrease in the amount of catechin in model solutions of must and wine. AA

1816

Romero (LI), Nebot (E), de la Ossa (ME) and Sales (D). **Microbiological purification kinetics of wine-distillery wastewaters.** *Journal of Chemical Technology and Biotechnology* 58(2); 1993; 141-149

Wine alcohol distilleries produce 8 vol. of high-strength effluents (known as vinasse) for every vol. of ethanol. The waste has an acidic character and a high organic content. 3 microbiological bioremediation treatments (aerobic, mesophilic anaerobic and thermophilic anaerobic) for the purification of vinasses were examined. Optimum operating conditions were attained when around 90% biodegradable chemical oxygen demand (COD) removals were achieved in every treatment. This requirement resulted in an optimum hydraulic retention time (HRT) of 8 days for aerobic, 6 days for mesophilic anaerobic and 4 days for thermophilic anaerobic processes. Experimental results were compared with those obtained from a substrate utilization kinetic model. The model accurately predicted the performance of these processes, except at HRT shorter than min., since these systems work under transient conditions. A comparison between kinetic coeff. obtained from the model showed that a thermophilic anaerobic process was the most efficient, since the process reached the same purification level, could be energy self-maintaining and needed smaller process plants than the other 2 systems. AA

Non-alcoholic beverages

Fruit juices

Apple juices

1817

Bayindirli (L), Oezilgen (M) and Ungan (S). **Mathematical analysis of freeze concentration of apple juice.** *Journal of Food Engineering* 19(1); 1993; 95-107

Apple juice concentrate was produced by freeze concn. A double-strength juice was produced in a single-stage process, whereas with a multi-stage process higher concn. levels were achieved. Lowering the refrigeration temp. shortened the time required to achieve a certain concn. level. To account for the distribution of the apple juice solids between the juice and ice, a distribution coeff. was found. A sigmoidal curve was fitted which described the freeze concn. process and which simulated the experimental data with correlation coeff. of approx. 0.99. AA

Cherry juices

1818

Sahin (S) and Bayindirli (L). **The effect of depectinization and clarification on the filtration of sour cherry juice.** *Journal of Food Engineering* 19(3); 1993; 237-245

Effects of depectinization and clarification on filtration resistance and rate of sour cherry (*Prunus cerasus*, a local var. [Afyon, Turkey]) juice were evaluated. Filtration studies on raw juice, depectinized juice and depectinized plus clarified juice were compared. Pretreatments reduced resistance considerably. Effects of the amount of precoating and the filter medium type on filtration rate were also studied. Decreasing the amount of precoating increased the filtration rate. Fabric filter medium had a lower resistance than commercial asbestos filter pads. BV

Orange juices

1819

Maccarone (E), Nicolosi Asmundo (-C), Cataldi Lupo (-MC), Campisi (S) and Fallico (B). **Oranwine. A new wine cooler with blood orange juice.** *Italian Journal of Food Science* 5(4); 1993; 397-408

A study on the preparation of 2 new low alcohol wine coolers from a common red table wine and blood orange juice, mixed in the ratios of 50/50 and 75/25 (v/v), is described. CO_2 was added after clarification. Effect of microwave treatment and storage at 4 and 20°C for up to 7 months was investigated. The products were characterized by evaluation of aroma components (terpenes and esters), colour and sensory analysis. Storage temp. played a more important role than microwave treatment on quality of the products. Comparison of sensory qualities and colour showed that the best wine cooler was the 50/50 untreated one stored at 4°C. It maintained freshness characteristics for up to 7 months of storage, while the other wine coolers had a shelf life of 3-5 months. AA

Tea

1820

Shi (Q-Z), Fouda (AE) and Matsuura (T). **Reverse osmosis transport and module analysis for green tea juice concentration.** *Journal of Food Process Engineering* 16(1); 1993; 1-20

Reverse osmosis experiments were performed to concentrate green tea juice, and experimental data analysed by using a set of transport equations together with osmotic pressure and density data for the green tea juice. Transport parameters obtained numerically by the above analytical procedure were then used to calculate several dimensionless quantities that can characterize a reverse osmosis module. An example of module design calculation was attempted using the dimensionless parameters obtained. It was found that an increase in operating pressure reduces the module length significantly when the feed tea juice concn. is high. An increase of the mass transfer coeff. on the high pressure side of the membrane has the same effect. AA

FATS AND OILS

1821

Yurawecz (MP), Molina (AA), Mossoba (M) and Yuoh (Ku). **Estimation of conjugated octadecatrienes in edible fats and oils.** *Journal of the American Oil Chemists' Society* 70(11); 1993; 1093-1099

Some isomers of conjugated octadecadienoic acid show anticarcinogenic and antioxidant properties. 27 vegetable oils (including corn, soya, rice bran, oat bran, cottonseed, safflower) and beef and bacon fats were studied, using UV spectroscopy, to determine the quantities of conjugated octadecatrienes (COT) present. COT levels ranged from < 0.001 to 0.2%. Using GC, COT levels estimated were lower (< 0.001-0.051%). Reduced peroxides of oleic and linoleic acid moieties were converted to conjugated dienes and trienes when methylated with boron trifluoride. Levels of COT which may cause health concerns or have anticarcinogenic activity are not presently known. BV

1822

Dobson (KS), Williams (KD) and Borlack (CJ). **The preparation of polyglycerol esters suitable as low-caloric fat substitutes.** *Journal of the American Oil Chemists' Society* 70(11); 1993; 1089-1092

Manufacture of polyglycerol esters (PG) suitable as low calorie fat substitutes is discussed. Linear polyglycerols (LPG) were prepared by a propriety polymerization process. PG oils were prepared by mixing LPG with pyridine; addition of oleoyl chloride, at temp. less than 70°C, and hexane to disperse reactants; filtering through glass wool; concentration by rotary evaporation; steam stripping; saturation with ethanol; and extraction with additional ethanol to obtain a level of less than 0.1% free fatty acid. Resulting PG oils were poorly absorbed by animals and fatty acid esters resisted hydrolysis by digestive enzymes. Results indicated that LPG esters had colour, odour, taste and physical properties similar to natural triglycerides; and that LPG oils may be suitable for use in non-nutritive edible oil applications, particularly those requiring stability at high temp. BV

1823

Roy (SS) and Bhattacharyya (DK). **Detection of interesterified fat in hydrogenated fat by lipase hydrolysis and by cooling curve analysis.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 923-925

Porcine pancreatic lipase hydrolysis and Jensen's cooling curve (JCC) methods were used to detect interesterified fat (IF) products in a mixture with hydrogenated fats (HFs). Lipolysis of IFs showed a greater amount of saturated fatty acids in the 2-monoglycerides in comparison with HFs. A similar trend in the distribution pattern of fatty acids was also noted in a mixture. IFs did not show any rise in temp. in JCC experiment, whereas HFs showed a distinct increase. A gradual increase in temp. was obtained for an IF when it was mixed with increasing content of a HF. HF showed a reduced temp. increase when it was mixed with an IF. Simultaneous detn. of the fatty acid profiles of the 2-monoglycerides and JCC characteristics can be used to detect the occurrence of one modified fat in another. BV

1824

Murali (HS), Mohan (MS), Manja (KS) and Sankaran (R). **Polar and nonpolar lipids and their fatty acid composition of a few *Fusarium* species.** *Journal of the American Oil Chemists' Society* 70(10); 1993; 1039-1041

Fusarium spp. [*F. lini* ITCC 788, *F. lycopersici* ITCC 1322, *F. oxysporum* ITCC 1635, *F.*

equeseti, F. moniliforme and *F. pallidoroseum*] were evaluated for their potential to produce lipids. Isolates exhibited wide variation with respect to the mycelial wt., total lipid content and % composition of polar (PL) and nonpolar lipids (NPL). Triglycerides were the major components (81-90%). Palmitic, stearic, oleic (OA) and linoleic acids (LA) were the major fatty acids in PL and NPL. PL contained higher levels of LA, whereas NPL contained OA as the predominant acid. NPL were more saturated than polar lipids. BV

1825

Suutari (M), Priha (P) and Laakso (S). **Temperature shifts in regulation of lipids accumulated by *Lipomyces starkeyi*.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 891-894

Effect of temp. on triglycerides by *Lipomyces starkeyi* was studied in 10-l fermentation experiments. The temp. during growth, lipid accumulation and post-accumulation phases was altered. The cellular lipid content, the glucose conversion efficiency and the specific lipid production rate were highest when the growth phase temp. was 28°C, instead of 16-18°C. The temp. of the accumulation phase had an influence on the lipid quality at the end of the accumulation. Oleic acid content increased from 52 to > 60% when the accumulation phase temp. was decreased from 28 to 15°C and, concomitantly, palmitic acid decreased from 33 to 26%. The degree of fatty acid unsaturation was highest (0.75 Δmol^{-1}) when the accumulation phase temp. was the lowest (15°C) and vice versa. The temp. shift after the lipid accumulation phase affected neither the composition nor the amount of accumulated lipids. Study indicates the temp. profile for the highest lipid yield with the most desired composition should be: (a) a growth phase temp. that gives the max. growth rate; and (b) an accumulation phase temp. that produces the desired ratio of palmitic to oleic acid. BV

Oils

1826

Chandrasekharan (CV) and Basu (AK). **Lipase catalysed hydrolysis of oils in microemulsion medium.** *Journal of the Oil Technologists Association of India* 26(2); 1994; 53-58

Low temp. hydrolysis of sunflower, rapeseed, groundnut, neem and karanja oils using SP 398, a liquid lipase derived from certain microorganism by fermentation, was studied at 40 plus or minus 2°C along with 30% water on the wt. of oils. Results indicated that lipase Sp. 398 was effective in all vegetable oils. Even after 16 h, the degree of hydrolysis ranged between 66.6 and 72.4%. GS

1827

Irandoust (S) and Edvardsson (J). **Poisoning of nickel-based catalysts in fat hydrogenation.** *Journal of the American Oil Chemists' Society* 70(11); 1993; 1149-1156

Discusses the poisoning of Ni-based catalysts in fat hydrogenation (FH) with reference to deactivation of hydrogenation of vegetable and fish oils; the poisoning effect of S and its role on the reactant adsorption in different hydrogenation reactions; factors affecting S resistance of the catalyst metal; and other inhibitors influencing FH (P compounds, free fatty acids, sodium soaps, chlorophyll, halogen compounds and products of lipid oxidation). BV

1828

Vazquez (TJF) and Guerrero. I. R.. **Regressional models that describe oil absolute viscosity.** *Journal of the American Oil Chemists' Society* 70(11); 1993; 1115-1119

Equations and correlation constants were obtained which describe the temp. dependent variation of the absolute viscosity μ) of 21 oils (sunflower, corn, rapeseed, sesame) and oil-liquid fat (melted butter) mixtures. Regression analyses were based on 2 approaches: (i) fitting the oil and oil-fat mixture viscosity profiles to a quadratic extension of the Andrade equation; and (ii) multiple variable regressional modelling. (i) provided the best predictive models (R^2 > 0.96), but the coeff. associated with temp. effect had no physical-chemical meaning. The multiple regressional approach (ii) fitted, in 1 equation, the μ of all 21 oil systems (r^2 equivalent to 0.93).

This equation included parameters such as saponification value and iodine value of the fatty acids of acylglycerols. Regressional models described effects of the cis double bonds and fatty acid chain length on interactions of acylglycerols which determine μ of the system and its capability to crystallize. Thus Multiple variable regressional analysis forms an excellent tool for better understanding the quantitative structure-functional property relationships in lipid systems. BV

1829

Blomberg (LG), Demirbueker (M) and Andersson (PE). **Argentation supercritical fluid chromatography for quantitative analysis of triacylglycerols.** *Journal of the American Oil Chemists' Society* 70(10); 1993; 939-946

Reports a method for quantitative analysis of neutral lipids. 4 different techniques were combined (supercritical fluid chromatography (SFC), silver ion chromatography, packed micro-columns and miniaturized evaporative light-scattering detection (ELSD)). Development and optimization of the method are discussed. Separation of a series of vegetable, fish and hydrogenated oils was demonstrated. Application of eluent composition programming resulted in excellent separation of complex samples. Packed microcolumn argentation SFC provides at least as high a separation power as corresponding HPLC methods. The combination of packed microcolumn SFC and miniaturized ELSD constitutes a powerful analytical system for the quantitative analysis of triacylglycerols. BV

Butter oils

1830

Sunfeld (E),Krochta (JM) and Richardson (T). **Separation of cholesterol from butteroil using quillaja saponins. II. Effects of temperature, agitation and concentration of quillaja solution.** *Journal of Food Process Engineering* 16(3); 1993; 207-226

Separation of cholesterol from butter oil was achieved by various processes based on contacting it with aqueous solutions of Quillaja saponaria saponins followed by separation of the cholesterol-saponin complex. 5 processes and controls were carried out as described in part I, namely: (i) Water Control (W); (ii) Reaction (R); (iii) Adsorption Control (A); (iv) Reaction + Adsorption (R + A); (v) Reaction + Washing (R + W). Analysis of variance models (ANOVA) indicated that the Adsorption Control process did not yield any significant cholesterol reduction over the Water Control; all other processes resulted in significant cholesterol separation in the order R + A greater than R + W greater than R. Levels of cholesterol reduction achieved by the R, R + W, and R + A processes were significantly affected by concn. of quillaja solution and temp. (0.04 or 0.40 mg/ml and 45, 55 or 65°C, respectively); level of agitation (high, medium or low) had no significant effect. Quillaja powder residue was present in the fat phase after Reaction (ii) but both adsorption and washing procedures significantly reduced it. AA

1831

Sundfeld (E), Yun (S), Krochta (JM) and Richardson (T). **Separation of cholesterol from butteroil using quillaja saponins. I. Effects of pH, contact time and adsorbent.** *Journal of Food Process Engineering* 16(3); 1993; 191-205

The technical feasibility of separating cholesterol from butter oil by contacting it with aqueous solutions of Quillaja saponaria saponins followed by separation of the cholesterol-saponin complex was studied. Alternative processes and controls compared were: (i) Water Control (W), where butter oil was contacted with pure water; (ii) Reaction (R), where butter oil was contacted with aqueous solution of saponins; (iii) Adsorption Control (A), where butter oil was contacted with water and diatomaceous earth was then added; (iv) Reaction + Adsorption (R + A), where diatomaceous earth was added to the Reaction medium (from ii); and (v) Reaction + Washing (R + W), where the aqueous phase resulting from Reaction (ii) was discarded and pure water contacted with the fat. The last step in all 5 processes was the separation of the fat phase where cholesterol was determined. Statistical analysis [using analysis of variance (ANOVA) models] indicated that the Adsorption Control did not yield any significant cholesterol reduction over the Water Control, while all other processes gave significant reduction. Order of cholesterol separation observed was R + A greater than R + W greater than R. Levels of cholesterol reduction were significantly affected by pH of quillaja solution [4.5 or 7.0] and amount of adsorbent used [0.05 or 0.25 g/g butter oil]; time of contact with quillaja solution had no significant effect over the range investigated [30 or 60 min]. Results indicate the technical feasibility of reducing cholesterol levels of butter oil using food grade quillaja saponins. AA

Olive oils

1832

Mannino (S), Cosio (MS) and Bertuccioli (M). **High performance liquid chromatography of phenolic compounds in virgin olive oils using amperometric detection.** *Italian Journal of Food Science* 5(4); 1993; 363-370

A simple and reproducible method for the quantitative determination of phenolic compounds in virgin olive oils was developed. Following solid phase extraction with a C18 Bond Elut cartridge and reversed-phase HPLC, these compounds were detected amperometrically using a dual electrode detector in the parallel configuration operating at +0.5 and 1.0 V vs. Ag/AgCl. Virgin olive oils of different origin and cv. and obtained using various techniques were analysed. Consistent recoveries of greater than 95% were achieved from spiked samples and the detection limit was in the order of 2 p.p.b. The method is easy to perform and can be used for large scale routine analysis. AA

1833

Montedoro (GF), Begliomini (AL), Servili (M), Petruccioli (M) and Federici (F). **Pectinase production from olive vegetation waters and its use in the mechanical olive oil extraction process to increase oil yield and improve quality.** *Italian Journal of Food Science* 5(4); 1993; 355-362

A multi-phase disposal process for olive vegetation waters (OVW), which result from the mechanical extraction of olive oil, was studied in relation to 2 main phases of the technological process: biological treatment of OVW to obtain an enzymic concentrate and direct recycling of this concentrate in the mechanical olive oil extraction process. The disposal treatment for OVW includes static settling, sterilization, fermentation, centrifugation (in which biomass is recovered and used as an animal feed) and ultrafiltration (resulting in a permeate that is discarded and an enzymic retentate conc.). The enzymic retentate conc. is recycled and used in the malaxation step in the mechanical olive oil extraction process. The fermentation step with the yeast *Cryptococcus albidus* var. albidus IMAT 4735 led to production of a polygalacturonase with an activity of 25 VU/ml in the culture broth. After centrifugation, the broth was concentrated by ultrafiltration (4-5x) and used in the extraction process. This operation resulted in an increase of 8-9% in olive oil yield and improved oil quality; turbidity, oxidation induction time, chlorophyll and contents of aromatic compounds were generally improved. AA

1834

Hamdi (M) and Garcia (JL). **Anaerobic digestion of olive mill wastewaters after detoxification by prior culture of *Aspergillus niger*.** *Process Biochemistry* 28(3); 1993; 155-159

Rapeseed oils

1835

Leger (LW) and Arntfield (SD). **Thermal gelation of the 12S canola globulin.** *Journal of the American Oil Chemists' Society* 70(9); 1993; 853-861

The nature of intermolecular forces responsible for thermal gelation of the 12S canola [rapeseed] globulin was determined by preparing gels under a variety of environmental influences. Effects of pH, Na salts and denaturing agents were evaluated by DSC, small amplitude oscillatory rheology and transmission light microscopy. Gels prepared with 6% protein at alkaline pH values were superior to gels prepared under acidic conditions. Na salts, which promoted protein stability, had an adverse effect on gelation. Addition of guanidine hydrochloride and dithiothreitol to protein dispersions prior to heating produced inferior gels. Hydrophobic forces and electrostatic interactions were responsible for the establishment of canola gel networks. Gel stabilization and strengthening were attributed to disulphide bonding, electrostatic interactions and H bonding. AA

SPICES AND CONDIMENTS

Spices

Tamarind

1836

Bhattacharya (S), Bal (S), Mukherjee (RK) and Bhattacharya (S). **Some physical and engineering properties of tamarind (Tamarindus indica) seed.** *Journal of Food Engineering* 18(1); 1993; 77-89

The chemical composition of tamarind (*Tamarindus indica*) seeds and kernels, as well as some industrially important physical and engineering properties, were determined. The kernel powder was rich in potassium. The shape of the whole tamarind seed did not conform to any of the standard shapes of seeds. The length, breadth, thickness, sphericity, roundness, surface area, average wt. and vol. per seed were also determined. The bulk density of raw, whole seed was slightly greater than that of roasted kernels. The surface area of seeds was linearly related to wt. per seed (r greater than or equal to 0.96, P less than or equal to 0.01). The angle of friction of whole seed was determined on rough, smooth, and very smooth surfaces. The angle of repose for roasted kernel (34-39°C) was higher than that of the raw whole seeds (31-35°C). AA

SENSORY EVALUATION

1837

Ofoli (RY) and Steffe (JF). **Some observations on the use of slit rheometry for characterizing the primary normal stress difference of extrudates.** *Journal of Food Engineering* 18(2); 1993; 145-157

Experimental evidence is presented to demonstrate that the standard procedure of linearly extrapolating pressure profiles through the exit of slit rheometers as a means of characterizing extrudate elastic properties is inappropriate. This widely used procedure, based on the assumption that the pressure gradient is constant over the entire instrument, is erroneous because the flow does not remain fully developed through the exit of the rheometer. AA

1838

Konik (CM), Miskelly (DM) and Gras (PW). **Starch swelling power, grain hardness and protein: relationship to sensory properties of Japanese noodles.** *Starch/Staerke* 45(4); 1993; 139-144

Relationships between starch swelling power (SSP) and Japanese noodle eating quality were examined for a range of commercial Australian wheat cv. from 2 growing seasons. SSP was dependent on cv., growing site and growing season of wheat. Analyses of the 1st season's samples showed highly significant relationships between swelling power and most noodle quality parameters ($r^2 = 0.16\text{-}0.45$, $P < 0.01$). Inclusion of wheat protein and wheat softness (PSI) with SSP in multiple regression equations provided improved relationships to most noodle quality parameters ($r^2 = 0.25\text{-}0.62$, $P < 0.01$). When tested on data from the 2nd growing season, predictions were useful, especially for the noodle parameters elasticity and eating quality. BV

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

1839

Siddiqui (SF), Pasha (MK), Ahmad (F) and Ahmad (M). **Digestibility of some**

non-conventional seed proteins. *Journal of the Oil Technologists Association of India* 26(2); 1994; 49-51

Pepsin digestibilities of 10 seed proteins, viz. *Hibiscus esculentus* (I), *Punica granatum (II)*, Boerhaavia retusa *(III)*, Cleome viscosa *(IV)*, Bauhinea purpurea *(V)*, Arachis hypogea *(VI)*, Santalum album *(VII)*, *Soybean (VIII)*, Cassia absus *(IX) and* Mucuna pruriens *(X), were determined in vitro by Lowry's method. Soybean proteins have higher digestibility value compared to* Arachis hypogea. *Digestibility of V, VII and X seed proteins is higher than soybean proteins. Seed proteins of I, II and III show higher digestibility compared to* A. hypogea *and lower digestibility values compared to soyabean. AA*

1840

Dahiya (S) and Kapoor (AC). ***In vitro* and *in vivo* availability of iron from home processed supplementary foods.** *Journal of Food Science and Technology (India)* 31(2); 1994; 122-125

Four supplements, containing 16.47 plus or minus 0.48 to 17.67 plus or minus 0.55 mg Fe/100 g and consisting of whole wheat, pearl millet, Bengalgram, greengram, groundnuts, amaranth leaves (*Amaranthus gangeticus*) and jaggery, were developed, employing home processing methods of roasting and malting. Domestic processing increased the *in vitro* Fe availability, due to lower levels of anti-nutrients. Pearl millet (*Bajra*)-based supplemented groups (III and IV) of rats showed significantly ($P < 0.05$) higher haemoglobin levels in blood than those fed wheat-based supplements (I and II) and similar levels to those of group fed on commercial food. The apparent absorption, balance and retention of Fe in rats fed on pearl millet supplements was also significantly higher than those of wheat-based ones and commercial product fed group. The data showed that home processed supplement mixes of cereals, pulses, nuts and leafy vegetables being good sources of Fe could improve Fe status of young children of low income groups. AA

1841

Farr (D). **Amino acids and flavour fermentations for use in foods.** *Journal of Chemical Technology and Biotechnology* 58(2); 1993; 201-203

Discusses the possible lessons to be learned by flavour technologists from a consideration of traditional Japanese fermentations for flavour compounds and seasonings. Fermentations included are soy sauce, miso and mirin. Fermented seasonings that could be incorporated into Western-style products by combining the koji fermentation with novel protein sources such as meat (animal or fish) or peanuts is suggested. BV

1842

Nabbut (NH). **The *Salmonella* problem in Lebanon and its role in acute gastroenteritis.** *Journal of Food Protection* 56 (3); 1993; 270-272

TOXICOLOGY

1843

Shantha (T). **Methods for estimation of aflatoxins. A critical appraisal.** *Journal of Food Science and Technology (India)* 31(2); 1994; 91-103

The review deals with advantages and limitations of most sophisticated and old methods so as to facilitate selection of most dependable and practical ones by the analysis of the developing countries. Aspects considered in this review are: importance of analytical methods, principles of estimation, steps in methodology, detection and estimation methods and overviews. 101 references. SD

1844

Brady (MS), White (N) and Katz (SE). **Resistance development potential of antibiotic/antimicrobial residue levels designated as 'safe levels'.** *Journal of Food Protection* 56(3); 1993; 229-233

Potential for 'safe levels' of antibiotics/antimicrobial residues (as defined by the FDA) to select for resistance in Staphylococcus aureus ATCC 9144, a sensitive bacterium, was investigated. S. aureus was exposed to safe levels of ampicillin, dihydrostreptomycin, erythromycin, neomycin, oxytetracycline and sulphamethazine, singly or in combinations of 3, for 14 days, transferring to fresh medium daily. After 14 days, min. inhibitory concn. (MIC) were determined. In control, 1.23% of samples showed an increased MIC. With exposure to single antibiotics, 7.40% of samples had increased MIC. When combinations of 3 antibiotics were used, 33.95% of samples showed increased MIC; this represents 27.6x the incidence of MIC increase seen in controls and 4.6x the incidence of increase seen with single antibiotics. Since food samples, such as milk, are bulked before distribution, there is potential for them to contain a variety of antibiotics. Data indicate that safe levels of antibiotics, that may be present in milk, have a strong potential for selecting resistant bacterial populations. AA

FOOD LAWS AND REGULATIONS

Nil

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